
EDINBURGH OBSTETRICAL SOCIETY
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THE TRANSACTIONS

OF THE

EDINBURGH OBSTETRICAL SOCIETY.

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OF THE

EDINBURGH OBSTETRICAL SOCIETY.

VOL. XV.

SESSION 1889-90.

EDINBURGH: OLIVER AND BOYD,
PUBLISHERS TO THE SOCIETY.
1890.

PRINTED BY OLIVER AND BOYD, TWEEDDALE COURT, EDINBURGH

PREFACE.

THIS, the fifteenth volume of the Society's Transactions, contains a record of its proceedings during the Session 1889–90.

In it, as in former volumes, the views brought forward in the papers are to be considered as those of the writers themselves, and not as those of the Society as a body.

November 1890.

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1844.	Do.	Dr Charles Bell.	John Kennedy, Esq.
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1848.	Do.	Dr Beilby.	Dr T. Graham Weir.
1849–53.	Do.	Dr Malcolm.	Dr Moir.
1854–55.	Do.	Dr Weir.	Dr Moir.
1856–57.	Do.	Dr W. Cumming.	Dr A. Thomson.
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1888–89.	Dr C. E. Underhill.	Dr D. Berry Hart.	Dr James Foulis. Dr A. J. Sinclair.
1890–91.	Dr D. Berry Hart.	Prof. A. R. Simpson.	Dr Peter A. Young.

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1859 Barker, Fordyce, LL.D., New York.
1882 Barnes, Dr Robert, London.
1882 Battey, Dr R., Rome, Georgia.
1882 Bennet, Dr J. Henry, Italy.
1886 Bozeman, Dr Nathan, New York.
1864 Braun, Professor Carl, Vienna.

1886 Chiara, Professor, Domenico, Florence.
1882 Clay, Dr Charles, Poulton-le-Fylde.
1864 Crédé, Professor, Leipzig.

1882 Emmet, Dr, New York.

1882 Freund, Professor, Strassburg.

1882 Goodell, Professor, Philadelphia.

1882 Hegar, Professor, Freiburg.
1882 Hicks, Dr J. Braxton, London.

1886 Keith, Dr Thomas, LL.D., London.

1890 Lusk, Dr W. T., New York.

1890 Neugebauer, Dr, Warsaw.

1851 Oldham, Dr Henry, London.
1889 Olshausen, Professor, Berlin.

1882 Pajot, Professor, Paris.
1882 Parvin, Professor, Philadelphia.
1882 Porro, Professor, Milan.

1864 Scanzoni, Professor von, Würtzburg.
1882 Schultze, Professor B. S., Jena.
1882 Spaeth, Professor, Vienna.

1882 Stadtfeldt, Professor, Copenhagen.
1864 Stolz, Professor, Nancy.
1864 Storer, Professor, Boston, U.S.

1890 Tait, Professor Lawson, LL.D., Birmingham.
1882 Tarnier, Professor, Paris.
1882 Thomas, Professor T. G., New York.
1882 Tibone, Professor, Turin.
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1887 Wells, Sir Spencer, M.D., London.
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1848 Allen, Mr Edward, York.
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1863 Belgrave, Dr, Sydney.
1880 Bosch, Dr Van Den, Liége.
1873 Boyd, Dr John, Slamannan.
1863 Brown, Dr R. C., Preston.
1863 Burton, Dr John, Kelso.

1859 Cayzer, Mr Thomas, Liverpool.
1858 Coghill, Dr J. G. S., Ventnor.

1869 Davies, Mr Thos., Colwyn Bay.
1873 Donovan, Mr W., Birmingham.

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1859 Figg, Mr E. G., Edinburgh.
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1864 Grévé, Dr, Norway.
1875 Groesbeck, Dr Hermann J., New York.

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1870 Haynes, Dr Stanley, Malvern.
1880 Helme, Dr J. M., Rusholme.
1865 Henderson, Dr E., China.
1849 Higgins, Dr Chas. H., Birkenhead.
1866 Hubbard, Prof., Connecticut.
1887 Hume, Dr T., Surgeon-Major, India.
1882 Husband, Dr H. Aubrey, Manitoba.

1871 Johnston, Dr A. C., R.N., Edinburgh.
1882 Johnston, Surgeon-Major Wilson, India.

1845 Keith, Dr George S., Currie.
1867 Kingston, Dr, Montreal.
1874 Kleinwächter, Prof. L., Grätz.
1865 Krassowski, Professor, St Petersburg.

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1870 M'Kendrick, Prof., Glasgow.
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1866 Martin, Dr Karl, Berlin.
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1883 Mills, Dr B. Langley, India.
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1877 Moolman, Dr Henry, South Africa.
1869 Mossop, Mr Isaac, Bradford.
1878 Mundé, Dr Paul F., New York.
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1859 Myrtle, Dr A. S., Harrogate.

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1857 Parker, Dr, Nova Scotia.
1869 Paton, Dr J. W., Rockferry.
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1880 Reid, Dr James More, Aldershot.
1863 Ropes, Dr, Boston, U.S.A.

1864 Sanderson, Dr A. M., Musselburgh.
1878 Serdukoff, Dr A., St Petersburg.
1856 Skinner, Dr T., London.
1873 Slavjansky, Professor, St Petersburg.

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1854 Storer, Dr H., Boston, U.S.A.
1875 Sutugin, Dr V., St Petersburg.

1867 Thomson, Mr W., Wrenbury.
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1861 Veale, Dr H. R. L., London.

1872 Wallace, Professor John, Liverpool.
1879 Watt, Dr J. Douglas, Australia.
1840 White, Dr F. I., Perth.
1864 Whiteford, Dr James, Greenock.
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1869 Affleck, Dr J. O., 38 Heriot Row.
1886 Aikman, Dr Alfred, The Elms, Beverley Road, Hull.
1886 Aitchison, Dr R. S., 74 Gt. King St.
1889 Alexander, Dr G. F., A.M.D., The Castle.
1882 Alexander, Mr W. B., 8 Blenheim Place.
1888 Allison, Dr J., Kettering, Northampton.
1868 Andrew, Dr James, 2 Atholl Cres.
1885 Anglin, Dr W. G., 52 Earl Street, Kingston, Ontario.
1877 Archibald, Dr J., Woodhouse-Eaves, Loughborough.
1886 Armitage, Dr J. A., 15 Waterloo Road South, Wolverhampton.
1889 Armour, Dr E. F., 27 Craigmillar Park.
1884 Arnott, Dr James, Surgeon-Major, Professor of Midwifery, Medical College, Bombay.
1883 Astley, Dr F. Dukenfield, Quyon, Ottawa, Canada.

1880 Badger, Dr W., Penicuik.
1887 Baildon, Dr F. J., 57 Hoghton Street, Southport.
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1889 Jamieson, Dr Hugh, 3 Hart Road, West Hartlepool.
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1879 M'Watt, Dr John, The Square, Duns.
1885 Macwatt, Dr R. C., Indian Medical Service, 15th Bengal Cavalry, Peshawur, Bombay.
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1879 Marshall, Dr Thomas, 55 Fortess Road, London, N.W.
1884 Marshall, Mr William, Milnathort.
1888 Martin, Dr Chris., 3 The Crescent, Birmingham.
1887 Martin, Dr J. W., Gie Appantoo, Axim, Gold Coast, Africa.
1887 Matheson, Dr A. A., 33 Buccleuch Place.
1888 Matheson, Dr F. W., 33 Buccleuch Place.
1885 Matthew, Mr Alex., Corstorphine.
1877 Menzies, Dr David, 20 Rutland Sq.
1847 Menzies, Dr William, 115 Lothian Road.
1866 Messer, Dr Fordyce, Helensburgh.
1885 Michael, Dr Gustave, 188 Commercial Road, London, E.
1884 Millard, Dr W. W., 3 George Place.
1886 Miller, Dr W. H., 6 West Circus Place.
1885 Mills, Dr James, Janesville, Wisconsin, U.S.A.
1876 Moir, Dr Alex., 30 Buccleuch Place.
1840 Moir, Dr John, 52 Castle Street.
1880 More, Dr Jas., Rothwell, Kettering, Northampton.
1888 Morison, Dr Albert E., Brougham Terrace, Hartlepool.
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1877 Murphy, Dr James, Holly House, Sunderland.
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1878 Murray, Dr D. R., 41 Albany Street, Leith.
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1889 Nairne, Mr J. Stuart, 12 Royal Crescent, Crosshill, Glasgow.
1878 Napier, Dr A. D. L., 67 Grosvenor St., Grosvenor Sq., London, W.

1888 Narayan, Mr Kumar B., 13 Brook Villas, Hanwell, London, W.
1885 Nesham, Dr T. Cargill, 12 Ellison Place, Newcastle-on-Tyne.
1884 Neve, Dr E. F., Srinagar, Kashmir, N.W. India.
1886 Nisbet, Dr W. B., Townsville, Queensland, Australia.

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1885 Oliphant, Dr E. H. Lawrence, 18 Burnbank Terrace, Glasgow.
1887 Orr, Dr John, Innerleithen.
1889 Orr, Dr W. Basil, The Chalmers Hospital, Lauriston Place.

1883 Pairman, Mr T. Wyld, Te Awamutu, Waipa, Auckland, N.Z.
1888 Pareira, Dr Jervis, Delegado da Saude, do Districto de Lourenço Marguz, Em Mozambique, Africa Portuguesa.
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1840 Peddie, Dr Alex., 15 Rutland St.
1882 Peddie, Dr H. Anderson, 24 Palmerston Place.
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1888 Pirie, Dr John, St George's House, Chorley, Lancashire.
1873 Playfair, Dr John, 5 Melville Cres.
1890 Poole, Dr T. D., Skippool, Poulton-le-Fylde.
1875 Porteous, Dr J. Lindsay, 83 Warburton Avenue, Yonkers, New York.
1890 Price, Dr A. W. Gordon, 22 Rankeillor Street.
1890 Price, Dr E. F. T., 28 Mayfield Rd.
1889 Price, Dr Joseph, 500, 20th Street, Philadelphia, U.S.A.
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1886 Pringle, Dr J. Hogarth, 5 Livingstone Place.
1884 Proudfoot, Dr Thos., 13 Lauriston Place.
1885 Puckle, Dr S. Hale, Bishop's Castle, Shropshire.

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1869 Rattray, Dr A. M. T., Portobello.
1887 Reid, Dr J. Robertson, Helmsley, Yorks.
1880 Reid, Dr W. L., 7 Royal Crescent, Glasgow, W.
1880 Reid, Dr W. Spence, Oakley, Kirkcudbright.
1882 Rendell, Dr Herbert R., P.O. Box 606, St John's, Newfoundland.
1884 Richardson, Dr Wm., Bath Lodge, Reading.
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1880 Ritchie, Dr James, 14 Charlotte Sq.
1861 Ritchie, Dr R. Peel, 1 Melville Crescent.
1887 Roberton, Dr Ernest, Auckland, New Zealand.
1890 Roberts, Dr Ernest T., Newport, Salop.
1881 Robertson, Dr J., 30 Lauriston Pl.
1870 Robertson, Dr W. B., St Anne's, Thurlow Park Road, West Dulwich, London, S.E.
1889 Robertson, Dr W. G. A., 26 Minto Street.
1890 Robinson, Dr H. Shapter, 12 North Bridge St., Monkwearmouth.
1887 Robson, Dr B. S., 66 Brighton Grove, Newcastle.
1887 Ronalds, Mr Tennent, Bonnington House.
1877 Ronaldson, Dr T. R., 3 Bruntsfield Terrace.
1867 Rosa, Dr George, 12 Gayfield Sq.
1889 Ross, Dr James F. W., Sherborne Street, Toronto, Canada.
1879 Rowland, Dr L. Lindsay, Salem, Oregon, U.S.A.
1886 Rumboll, Mr Sydney, Belgaum House, Woodhouse Lane, Leeds.

1889 Sang, Mr J. E., 9 Howard Place.
1885 Saunders, Mr F. A., Denburn, Crail.
1880 Scott, Dr T. R., Musselburgh.
1887 Shiels, Dr G. F., 229 Geary Street, San Francisco.
1884 Simmons, Dr Fourness H., 5 Union Terrace, George Street, Brisbane, Australia.
1858 Simpson, Prof. Alexander R., 52 Queen Street.
1882 Simpson, Dr James, Eastwood, Ferry Road.
1887 Sloan, Dr S., 5 Somerset Place, Sauchiehall St. West, Glasgow.
1882 Smart, Dr David, 24 Hartington Road, Sefton Park, Liverpool.
1870 Smith, Mr D., Fullerton Cottage, Johnshaven, Montrose.
1885 Smith, Dr John, Brycehall, Kirkcaldy.
1888 Sneddon, Dr William, Cupar-Fife.
1881 Somerville, Dr Robert, Galashiels.
1867 Spalding, Dr William, Gorebridge.
1878 Spence, Dr R., Burntisland.
1884 Spence, Dr William, Dollar.
1884 Stewart, Mr J. S., 16 Merchiston Terrace.
1885 Stewart, Dr R., 19 Buccleuch Place.
1879 Stewart, Dr W., Kirkwall.
1866 Stirling, Dr Stewart, 6 Clifton Terrace.
1851 Struthers, Dr James, 39 Charlotte Street, Leith.

1887 Sturrock, Dr J. F., Homewood, Broughty-Ferry.
1887 Sutherland, Dr G. A., 45 Carlton Hill, St John's Wood, London, N.W.
1885 Sym, Dr A.C., 144 Morningside Rd.

1887 Talent, Dr J. W.,
1868 Taylor, Dr Wm., 12 Melville Street.
1887 Teacher, Dr C., 16 Newington Road.
1888 Temple, Dr G. H., The Hospital, Weston-super-Mare.
1888 Tennent, Dr J. T., Bathgate.
1877 Thatcher, Mr C. H., 13 Albany Street.
1884 Thom, Dr Alexander, Viewfield, Crieff.
1877 Thomson, Mr A. D. R., Musselburgh.
1887 Thomson, Dr Alexis, 2 Coates Crescent.
1881 Thomson, Dr James, David Place, St Heliers, Jersey.
1887 Thomson, Dr John, 14 Coates Crescent.
1877 Thomson, Mr J. Stitt, Dalkeith.
1887 Thyne, Dr T. J., 1 Dean Terrace.
1887 Tillie, Dr Joseph, 10 Castle Terrace.
1887 Tristan, Mr R. J., Retford, Notts.
1889 Turnbull, Dr James L., Newton P.O., Ontario, Canada.
1869 Turnbull, Dr M., Coldstream.

1872 Underhill, Dr C. E., 8 Coates Crescent.
1885 Underhill, Dr Fred. T., Princes End, Tipton Green, Staffordshire.
1879 Underhill, Dr T. Edgar, Bromsgrove, Worcestershire.

1886 Walker, Dr A. Wallace, 24 Forth Street.
1879 Wallace, Dr Abraham, 64 Harley Street, London, W.
1887 Watson, Mr P. H., 72 Jesmond Road, Newcastle-on-Tyne.
1865 Watson, Dr W., Mid-Calder.
1881 Waugh, Dr John, 36 Finsbury Pavement, London, E.C.
1881 Webster, Dr A. D., 20 Newington Road.
1889 Webster, Dr J. C., 56 Queen Street.
1882 Weight, Dr R. Hill, 2 Copthall Buildings, London, E.C.
1840 Weir, Dr T. Graham, 36 Heriot Row.
1879 Weir, Dr Walter, 21 Central Hill, Norwood, London, S.E.
1889 Welby, Dr Frederick E., Colonial Surgeon, St Helena.
1886 Whitton, Dr A. B., Aberchirder.
1887 Wicks, Mr Charles, South View House, West Parade, Newcastle-on-Tyne.
1889 Wilkinson, Dr George, Royal Infirmary.
1867 Will, Dr Ogilvie, 305 Union Street, Aberdeen.
1889 Williams, Dr J. D., 4 Parkside Terrace.
1845 Wilson, Dr David, 12 Dean Terrace.
1890 Wilson, Dr James, 53 Inverleith Row.
1879 Wilson, Dr T. D., 10 Newington Road.
1889 Wood, Dr A. Fleming, City Fever Hospital.
1880 Wood, Dr Russell, 9 Darnaway St.
1886 Wood, Dr Thomas, 55 Ferry Road.
1887 Wright, Dr W. F., 6 Nelson Street.
1879 Wylie, Dr Hamilton, 1 George Pl.

1861 Young, Dr James, 14 Ainslie Place.
1859 Young, Dr Peter, 43 Heriot Row.
1871 Young, Dr Peter A., 25 Manor Pl.

1850 Ziegler, Dr Wm., 47 George Square.

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TRANSACTIONS

OF THE

EDINBURGH OBSTETRICAL SOCIETY.

FOR SESSION LI., 1889-90.

MEETING I.—NOVEMBER 13, 1889.

DR UNDERHILL, *retiring President, afterwards* DR BERRY HART, *President-elect, in the Chair.*

I. JUBILEE ADDRESS: SKETCH OF THE HISTORY OF THE OBSTETRICAL SOCIETY.

By CHARLES EDWARD UNDERHILL, M.B., F.R.C.P. Ed.

GENTLEMEN,—I have now the pleasant duty to perform of resigning into your hands the office to which you did me the honour to elect me two years ago, and to thank you for the unvarying courtesy and kindness which I have received while acting as your President. I rejoice that in your choice of a successor you have fixed upon one so able and so hard-working as Dr Berry Hart. It augurs well for the future welfare of the Society that it can find a man with such a brilliant record of original work, and such a wide knowledge of our branch of the profession, both in its scientific and its practical aspects, to fill the office of President.

It is customary for the President on resigning his charge to pass in review the events which have occurred during his term of office, to note the chief papers read, and the other work which has been accomplished at our meetings, and to glance at any changes which may have taken place in our *personnel*. But on this occasion there is one event of such outstanding interest—I mean the celebration of our Jubilee, the great fact in our history that we have arrived at fifty years of existence as a Society—that it occurred to me I could not do better than give you some details of the origin

and foundation of the Society, glance here and there at important points in its history, and note as we go along the more valuable original papers and communications which have been read before it. With this view I have carefully looked through the records of the Society, and I must say that, generally speaking, these records have been remarkably well kept. The reports of the meetings are fairly full; and what is quite as much to the point in the view of one who has to read them, the handwriting is uniformly legible, a remarkable circumstance when we consider how many different hands have composed them, and that all of the writers were doctors. There is one exception to this statement—for two or three meetings the records are in a lady's handwriting, doubtless the wife of the Secretary for the time being, and thus half a doctor.

It was on 4th December 1839 that a meeting was held in the New Town Dispensary, Thistle Street, for the purpose of considering the propriety of establishing an Obstetrical Society in Edinburgh. It seems to have been a movement originating chiefly among the younger members of the profession who were practising Midwifery, and who were dissatisfied with the position that branch of Medicine held in the eyes of the profession and of the public, and who were anxious and determined to make an effort to raise it to a position more worthy of the important interests it guarded and the onerous duties it performed.

For at that time, in spite of the great works of William Hunter, Denman, Hamilton, Burns, and others in this country, and of Naegele, Michælis, Dubois, Coste, and others abroad, the practitioners in obstetrics were looked upon by their brethren as being engaged in the practice of an inferior sort of art, which had little connexion with either of the great departments of Medicine and Surgery. Midwifery, in fact, was, in England at all events, "neither fish, flesh, nor good red herring." Neither the College of Surgeons of England, nor the College of Physicians of London, nor the Apothecaries' Society examined any of the candidates for their diplomas in Midwifery, nor did they require certificates of attendance on lectures on this subject to be presented to them as part of their qualifying courses. In the year 1825 an Obstetric Society was founded in London for the purpose of rectifying this omission, and though it contained the names of most of the teachers of Midwifery at the various London Schools, and wrote endless memoirs to these three bodies, and even memorialized Sir Robert Peel, who was Home Secretary, on the matter, it was long before any change or improvement took place. But this movement showed that the teachers of the subject were, at all events, not unaware of its vast importance to the health and well-being of the community.

In Dublin, also, there was a move forward, and in the year 1838 an Obstetrical Society had been formed, with Dr E. Kennedy,

the then Master of the Rotunda, for its President, the objects of which were, as he comprehensively defines them in his inaugural address, "to improve the obstetric practitioner, to extend the bounds of his science, and thus, directly and indirectly, to benefit our species."

It was thus, amidst a general awakening to the sense of the importance of this branch of Medicine, that our Society came into being.

At the preliminary meeting on the 4th December 1839, just one month after the death of Professor Hamilton, who had filled the Chair of Midwifery for nearly forty years, there were present ten members of the profession, while ten more had sent in by letter their approval of the idea of forming such a Society; and the meeting, which was presided over by Dr Fairbairn, there and then constituted itself into an Obstetrical Society, with twenty original members, and appointed a committee to frame regulations and make all the necessary arrangements. It is a remarkable circumstance that, of the twenty original members, six are still living after the lapse of fifty years—namely, Dr John Moir, Dr Charles Bell, Dr George Paterson, Dr Peddie, Dr Malcolm, and Dr Graham Weir—and long may they survive.

A second preliminary meeting was held on 4th January 1840, at which the committee reported that they had obtained permission from the managers of the New Town Dispensary to hold the meetings of the Society on its premises for the next six months, and they produced the code of laws which they had drawn up; these were, after discussion, approved, and remain virtually the laws which govern the Society at the present time. I will quote the first law, because this defines the aim and object of the Society. It stands thus in the minute-book:—"The object of the Edinburgh Obstetrical Society shall be to advance Obstetric Medicine, by holding meetings for the purpose of receiving communications and conversing on subjects connected with that branch of the profession. In furtherance of this object, each member is expected to contribute to the Society such interesting cases in that department as may fall under his notice, and to exhibit any morbid specimens of interest that he may meet with. All communications are understood to be strictly confidential."

The first regular meeting of the Society thus constituted was held a few days later, viz., on Monday, 14th January 1840, when the members signed their names. It may be of interest to record the names of these original members. In addition to those mentioned above, they were,—Drs R. Renton, Fairbairn, Lewins, J. S. Combe, Pagan, F. Farquharson, John Kennedy, W. Beilby, W. Dumbreck, Charles Sidey, Alexander Wood, William Purdie, Charles Ransford, and A. Ziegler.

The first office-bearers of the young Society were,—President, Dr Beilby; Vice-Presidents, Drs Combe and Renton; and Secre-

taries, Dr G. Paterson and Dr Ransford. Among those who applied for admission at this meeting were Dr J. Y. Simpson, Dr Pattison, and Dr Robert Paterson of Leith, who were duly elected at the following meeting.

The first piece of public business was a case, mentioned by Dr Beilby, of Spontaneous Change of Presentation during Labour. At the commencement of labour he distinctly felt a hand presenting; eighteen hours later the head presented normally. A discussion followed, in which a similar case was mentioned by Dr Sidey, which was, moreover, complicated by hernia; and the discussion took the form of the management of labours in the presence of hernia.

At the next meeting, a fortnight later, five new members were elected and six more proposed—the Society evidently meeting a recognised want. Dr Lewins read a case of Locked Twins, which terminated spontaneously, the second child being born alive—his paper containing a notice of six similar cases gathered from the literature of the subject; another was mentioned by Dr Moir as having occurred in the practice of his father. A valuable paper by Dr John Reid, the well-known physiologist, was communicated at this meeting, entitled "A few Observations on the Formation and Arrangement of the Membrana Decidua," in which he described, I believe for the first time, the glands of the uterine mucous membrane, and compared them to the similar stuctures, not long before discovered, in the stomach. He further stated that in two uteri, examined at an early stage of pregnancy, he had found openings in the decidua corresponding to the openings of each Fallopian tube.

At the following meeting one of the members proposed was black-balled, an occurrence sufficiently rare in the Society's history to justify its mention. What the reason was for this strong measure we are not told, but possibly one of the numerous quarrels which at that time not unfrequently agitated the calm waters of professional life was at the bottom of it.

On 9th March Sir J. Y. Simpson made his first communication to the Society—a case of Central Rupture of the Perineum, with this peculiarity, that the tear was transverse, and the infant was born through it. He presented the Society with a wax cast of the preparation.

On 11th May Dr Ziegler showed his well-known forceps, and described their action; and on 25th May Dr Beilby communicated "Some Practical Cases in Midwifery." They were twelve in number, and dealt mainly with the use of bleeding, tartar emetic, and the forceps, as aids in tedious labour. In this paper was recorded one of those rare cases of complete separation of the placenta before the commencement of labour, with concealed hæmorrhage, which led to the death of the patient shortly after delivery. Case 2 was still more remarkable; it was headed, "Arm Presentation; Extraordinary Uterine Contractions; Head left in Womb." It was

extraordinary for more things than the contractions: the treatment at the hands of the surgeon who first saw it consisted in the administration of 300 drops of laudanum (in three doses) to begin with. Dr Beilby was then called in; but it was not until she had lost 66 oz. of blood, taken 630 drops of laudanum by the mouth and 300 by the rectum, and received two tobacco enemas, that the head was extracted by craniotomy forceps; the uterus then again contracted, and she was left till next day. After another bleeding and another tobacco enema the placenta was removed, and the patient made a good recovery. We may well feel thankful that, during the fifty years which have elapsed since then, other more efficient and less severe means of combating uterine contractions have been devised.

A little later in the session, Dr Sidey read a paper on Diseases of the Heart in connexion with Pregnancy, and advocated the propriety of speedily terminating the second stage of labour in all cases where there have been symptoms of disease of the heart.

The Society at this time began to elect Corresponding Members, Dr Fleetwood Churchill of Dublin being the first name on that honourable list.

By the end of the first session the Society had outgrown its meeting place, and the first meeting of the second session, 12th October 1840, was held in No. 13 Queen Street. The notable feature of this meeting and session was Dr John Reid's classical paper, "Some Observations on the Anatomical Relations of the Bloodvessels of the Mother and those of the Fœtus in the Human Species." This well-known paper deals exhaustively with the utero-placental circulation, and forms the basis of most of our subsequent knowledge on the subject. It was afterwards published in the *Edinburgh Monthly Journal* for January 1841. Dr Beilby was again elected President, and the list of Corresponding Members was increased by the addition of Drs Radford, Manchester; Robert Lee, London; Montgomery and Evory Kennedy, Dublin, and others. The day of meeting was changed from Monday to Tuesday, the meetings being held on the second and fourth Tuesdays of the month. On 22nd December a publishing committee was appointed, and reported in favour of publishing abstracts of the proceedings and papers, revised by their authors, at such intervals as the Council should think proper. This report was approved of by the Society. During this session several well-known Edinburgh names first appear among the members, viz., Drs Andrew, Dunsmure, Cumming, and John Brown. Among the more important papers was one by Dr Simpson on a case of Extra-uterine Pregnancy, which went to the full time; the mother recovered, but died insane some years later, when the diagnosis was verified by a sectio. This was the first case of extra-uterine pregnancy on record in which the fœtal heart was heard. Dr Ziegler read a case of Fatal Concealed Hæmorrhage, in which the

patient died undelivered. Dr Simpson reported a case of cephalotripsy, then a new operation devised by the younger Baudelocque, and showed the instrument. In the course of a discussion on amenorrhœa Dr Ziegler advised the use of electricity, and described his method, which he said was very simple and very effectual.

At the end of this session there were thirty-nine members enrolled.

In the third session, November 1841, Dr Simpson was elected President for the first time, and he continued to occupy the chair without any intermission until 1858,—a circumstance which doubtless contributed in no small degree to the success of the Society, and to the extent and excellence of the work it produced. At the first meeting Dr Fairbairn read a paper on Extra-uterine Gestation, which appeared with a drawing in the *Edinburgh Journal* for 1842. At the next meeting a similar contribution was read by Dr Williamson. The most valuable of the contributions during this session were Simpson on Spontaneous Amputation of Limbs in Utero, and on Nægele's views on the Mechanism of Parturition, and the change from third to second position; Moir on the Mechanism of Face Cases, in which he advocates their being left to Nature in almost all cases; and a case of Cæsarean Section—a great rarity then, as now, in Scotland—in a small deformed woman, by Dr Ross of Invergordon. The woman died on the fifth day, but the child survived.

The fourth session was signalized by Simpson's initial paper on the Uterine Sound as a means of Diagnosis, in which he incidentally remarks on the use and value of bimanual examination. Two cases were recorded of emphysema occurring during labour, followed by recovery. In both of them ergot had been given. And one case of death on the day after delivery, in consequence of the entrance of air into the circulation, apparently from the sucking action of a flaccid heart,—bubbles of air were found in the heart. At two of the meetings, as there were no papers, the Society discussed subjects from a list drawn up by the Council. The subjects chosen, viz., Displacement of the Unimpregnated Uterus, and treatment of the Diseases of the Os and Cervix. Dr Malcolm also read a short but graphic account of a case of rupture of the uterus where the child was hydrocephalic. The head measured 20 inches in circumference.

In the fifth session (1843-4) a curious case of imposture was related by Simpson. A young girl in the country declared that she had at various times given birth to animals resembling field mice in a state of decomposition. Several reputable persons had been present on these occasions, and on the last one an "educated" (*sic*) midwife was present, and she stated that on her arrival one had been already born, and on giving ergot two more were expelled in her presence. Specimens of the animals passed were

exhibited to the Society, and turned out to be field mice sure enough, but *previously skinned.*

Simpson also made some remarks on the diagnosis of ovarian tumours and their extirpation. He mentioned that during the previous twelve months the operation had been performed in twelve cases, of which only two had died; but that in two cases, during the same time, the abdomen had been opened and no tumour found. Both these women died. Dr Patterson mentioned a fatal case of eclampsia, where the fits had produced emphysema of the face and chest. And Dr Keiller (then of Dundee) communicated five cases of placental presentation in which the placenta had come away before the birth of the child without fatal hæmorrhage. During this session Simpson read his much debated paper on the Attitude of the Fœtus in utero.

Session 6 (1844-5) began with the pleasant announcement that no contribution would be levied during the session owing to the large balance in the hands of the Treasurer. At this time the meetings took place at the houses of certain members in rotation. Dr Martin Barry and Dr G. Keith were elected members, and most of the meetings were spent in obstetrical conversations. On 31st July 1845 was held the first recorded dinner of the Society. It was a fish dinner at Newhaven, and was attended by fifteen members.

Session 7 presents no features of interest.

From April 1846 to January 1847 the minutes are awanting. At the latter date (8th session) the Society had again returned to the New Town Dispensary, and held their meetings only once a month. In fact, want of papers during the previous session seems to have told on the prosperity of the Society, and with a view to restoring suspended animation, it was resolved to publish regular abstracts of the proceedings in the *Edinburgh Monthly Journal.* On 20th January of this year Simpson read a case of Turning in Narrow Pelvis under the influence of Sulphuric Ether. This case was of interest in two points,—one the use of ether, the other the employment of version in the case of a narrow brim; the woman in her previous labour had been delivered by craniotomy after forceps had failed. She had had hip disease in childhood. At the next meeting Simpson made an elaborate communication on the use of Ether in Labour, claiming that while the suffering was in great part removed, the uterine contractions were not interfered with, and the third stage progressed normally. Carcinoma of the Cervix in Pregnancy; Labour obstructed by Ovarian Tumour and by Fibrous Tumours; Hydatigenous Ovum; cases of Spontaneous Evolution; Fatal Hæmorrhage from the Umbilical Cord; and Puerperal Convulsions connected with Inflammation of the Kidney, were among the subjects on which papers were read by various members during this session. Of these there are unusually full and interesting notes in the minutes. Dr Keiller was elected a member during this session. Again there is a lapse of a year in

which no records of the public business appear in the minutes. Meetings were held, however, and non-resident members were divided into honorary members and corresponding members, as they at present exist. Dr Thatcher and Dr Matthews Duncan were elected ordinary members.

I subsequently discovered an excellent record of the proceedings of this session (1847-48) in a volume of pamphlets in the library of the College of Physicians. It was a reprint from reports in the *Monthly Journal*. Most of the work came from Simpson, who, in addition to showing and describing his forceps, made several contributions to the use of chloroform; read a case of the removal of a very large Fibroid, upwards of three pounds in weight; and at the last meeting read a report of the first two years of the Edinburgh Maternity, which was opened in St John Street in May 1844, and removed to Milton House, Canongate, in 1846. The report is a valuable one, and full of interesting statistics. The mortality among the patients delivered in the hospital, 374 in number, was 7, or about 2 per cent. Of those delivered outside, 1101, 4 died, or about 1 in 270. It is noticeable that out of the whole 1475 cases, the forceps was only used three times and the crotchet once. A double monster was exhibited by Dr Lyell, and papers were read by Dr Moir on the Induction of Premature Labour, and by Dr Keiller on Noma.

At the second meeting of the following session (10th), 10th January 1849, Simpson read an account, by Dr Norris of North Petherton, of a case of Puerperal Convulsions, where chloroform was used with the effect of preventing any return of the fits, and subsequently made some remarks on the use of chloroform in labour; and at a subsequent meeting Dr Thatcher related two cases in which the uterus ruptured during labour, but the women recovered. During this session Dr Priestley became a member.

The records for the next few sessions are short, little more than the names of the papers being recorded. I shall pass them over very briefly. Two cases of tetanus following miscarriage, and proving fatal, were recorded—one by Dr Wood, the other by Dr Malcolm. Simpson read his paper on Labour obstructed by an Arm being caught in the Nape of the Neck; and another on the great frequency of Lacerations of the Perineum and Cervix in Natural Labour. In 1851 Dr Oldham of London, who still survives, was elected an honorary member. Dr Duncan read some cases of Spurious Menstruation in newly-born Infants; Dr Keith a case of Sudden Death after Delivery, from Clot in the Heart; and Dr Keiller a detailed account of a case of Spurious Pregnancy and Labour. More than once during these years suggestions were made for the publication of a volume of Transactions, but they came to nothing.

In 1854 (session 15) Dr Duncan read his valuable paper on the

Pelvic Articulation during Labour, pointing out that the sacro-iliac joints normally allow a considerable degree of motion.

Simpson reported three cases of simple tapping of ovarian tumours which proved fatal—a serious warning regarding this proceeding which the profession were long in taking to heart.

In session 19 a change was at length made in the Presidentship, Dr Moir being elected to that office on the 9th December 1857. About this time two interesting persons were shown to the Society—one being M. Groux, whose congenital fissure of the sternum provided material for much good physiological work; the other was a woman whose head, fifty-two years before, Mungo Park, the celebrated traveller, had commenced to perforate; before he could finish the operation she was born by natural efforts; the record states that there was a "considerable depression of bone." In December 1858 Dr A. R. Simpson was elected a member. On 9th March, 1859, Dr Keiller read a paper on "A New Mode of Inducing Premature Labour," and showed the indiarubber bags he had devised for the purpose. This was, I believe, the first time in which dilators of this kind were employed. At the following meeting Dr Figg gave an account of his practice of Turning in Natural Labour. He had turned in the past two years 127 times, fifteen being cases of extra difficulty, the rest normal labours. Two mothers were lost—one after bearing her sixth dead child, the other one hour after labour, complicated from the beginning with hæmorrhage; seven children were lost within twelve hours after birth, none of these being in the ordinary cases. Four infants had their arms broken; two severely, and fourteen slightly, sprained.

The following session Dr Keiller was elected President, December 1859. During the session there were several interesting discussions. The most important one relating to the effects of the various zymotic diseases, especially small-pox and typhus, upon pregnancy and upon the fœtus. Many members took part in the debate, and cases were related where the child was born marked with small-pox, and others where it seemed to have escaped altogether, and was born alive and well. Many of the women, but not nearly all, aborted. A little later in the session Simpson contributed his first case (successful) of removal of the Coccyx for Coccygodinia. It was during this session that the Society, following the precedent of the recently formed London Obstetrical Society, bestowed upon the members the name of Fellows.

In session 22 (1860-61) Mr Turner read the first of many valuable contributions to the Society, on Displacement of the Ovaries, describing a case where the left ovary had become detached and become adherent to the mesentery. Dr M'Laren of Lasswade recounted a case of Puerperal Tetanus with recovery, and Dr Keiller a fatal case of Vomiting in Pregnancy. In December 1861 Dr Pattison was elected President, and during the following

session Sir Arthur Mitchell communicated his valuable researches on the connexion between Twin Births and Idiocy, and on difficult Parturition as a cause of Idiocy. Dr Hamilton of Falkirk also raised a vigorous discussion by his strong advocacy of the use of the forceps and the consequent saving of infant life. In the course of the debate he stated that he had quite given up the use of ergot both during and after labour.

During the next session, January 1863, as small-pox was epidemic in the city at the time, a committee was appointed to draw up a memorial to the Town Council, urging the importance of getting a Vaccination Bill passed for Scotland, similar to the one in England, enforcing the performance and registration of vaccination. This was accordingly done, and a reply was received from the City Clerk stating that the Council had a Bill under consideration. This Bill subsequently became law, and has been followed by a great lessening in the amount of small-pox among us. After the passing of the Act it was criticised freely at a meeting of the Society, 24th January, but no further step was taken. In the same session Mr Lawson Tait contributed a paper on a case of Abortion of Twins. Simpson read a case of Extra-uterine Pregnancy, which he along with Dr T. Keith had opened per vaginam, thinking it was a hæmatoma, and had extracted a small fœtus and placenta. The woman, after being in great peril, eventually recovered.

Dr Graham Weir was the next President, elected December 1863, and at the same time, on the motion of Dr A. R. Simpson, the list of Honorary Fellows having become very small, twenty-two names were proposed, and they were duly admitted Honorary Fellows at the next meeting. They were all obstetricians of great eminence in Great Britain, the Continent, and America. A change took place in the laws at this time, as the Council, which had originally consisted only of the office-bearers, was increased by the addition of three Ordinary Fellows, to be elected annually by ballot. There was no paper of special interest during the session.

In session 26, Dr Bonnar contributed a laborious paper on a Critical Study of Superfœtation, which has been a mine of wealth to subsequent writers on the subject; and Dr Robert Finlay, who shortly after gave up Medicine for the Bar, a paper called "Notes on the History of Ancient Greek Midwifery." During this session Dr Angus Macdonald became a Fellow. In June 1865 the Society determined to find a more suitable hall in which to hold their meetings, and accordingly fixed on No. 5 St Andrew Square, where all the subsequent meetings have been held. Sir James Simpson, who shortly afterwards received his Baronetcy, was the next President, being elected on 29th November 1865. The work of this session was mostly of the ordinary routine discussions, relieved by a paper by Sir W. Turner on a case of

Pregnancy in a Rudimentary Uterine Horn, and a fatal case of Cæsarean Section by the President.

On 26th April 1866, reference was made in strong terms of condemnation to a letter which had appeared in *Punch*, dated from Edinburgh, and giving an account of the proceedings of the Society. It was unanimously agreed that if the author could be discovered and was a Fellow of the Society, he should be requested to retire from it. I cannot find that the author ever was discovered.

At the beginning of next session the laws were revised, printed, and circulated among the Fellows; with the addition of a new law permitting the admission to the Society's meetings of any registered practitioner introduced by a Fellow. Dr Matthews Duncan, whose name was long absent from the proceedings of the Society, appeared again this session with his well-known paper, "The Production of Inversion of the Uterus." Dr J. Young, in February 1867, contributed two fatal cases of Hæmorrhage from Scarification of the Gums. Dr A. Milne also read an important paper on the Comparative Value of Long Forceps and Turning in cases of Contracted Brim. I find a note of a prolonged discussion at the last meeting of the session in private, on a paper by Dr C. Bell, entitled "Notes on the Case of Sharp *v.* Wilson."

In November of this year Dr Burn was elected President, and during the session Mr C. E. Smith, surgeon of the "Diana," addressed the Society on the Diseases and Midwifery of the Esquimaux, also on the Effect of Protracted Exposure to Cold and Privations on the Human System; and at a subsequent meeting Dr Fraser read a note of a "Primitive Mode of Aiding Labour," extracted from Carver's *Travels in North America*. The mode consisted in the application of a handkerchief round the parturient woman's neck, till strangulation was nearly produced, and this was believed to increase the expulsive power of the pains. In this session also Dr Matthews Duncan described and exhibited his Cephalotribe; other instruments of the same type were shortly afterwards devised and shown by Sir J. Simpson and Dr Andrew Inglis.

The following session (30) is signalised by the decision (on the motion of Dr James Young) to publish a volume of Transactions at the end of the session. Dr Young desired the publication to be an annual one, but this was not at that time thought feasible; and the annual volume did not make its appearance till ten years later. Among other communications was an address by Sir J. Simpson on the Construction and Salubrity of Maternity Hospitals. In the course of his remarks, he alluded to the necessity of having a new Maternity Hospital for Edinburgh. He was of opinion that it should be built on the cottage system, and should not contain more than twenty or thirty beds. Each room should contain two or three women and a nurse; and some arrangement

should be made by which cases of puerperal fever could be at once removed from the hospital. It is a pity that these enlightened views were not taken into account when the New Maternity was built—for though under our present system of strict antisepsis puerperal fever is, or ought to be, a thing of the past, carelessness will sometimes creep in, and the prevention which is secured by isolation is the greatest possible aid to avoidance of infection. On 1st May 1869, Dr C. Bell gave a report of the cases attended at the Maternity Hospital during the past winter. This was the first Maternity Report, so far as I can find, which had been read to the Society for many years, and it was not until a good many years later that Dr Bell's example was followed, and the quarterly reports regularly published.

At the beginning of the next session (31st), December 1869, under the presidency of Dr C. Bell, it was agreed that steps should be taken to form a library for the Society, and Dr Keiller presented a bookcase for the reception of such books and pamphlets as might be received. Later in the session Sir J. Simpson read a case of Death while under Chloroform during the performance of Ovariotomy. He had given the chloroform himself, while Dr Brotherston of Alloa was performing the operation. The woman vomited, and died the moment the hand was introduced into the abdominal cavity. At later meetings Dr Craig reported a case of Puerperal Tetanus, and Dr Duncan read an important paper on the Production of Face Cases. In April of this year (1870) the first volume of Transactions was published; it contained the proceedings of the previous session, and was also enriched with a valuable Appendix containing a list of all the papers which had been read before the Society from its foundation, drawn up with much labour by Dr Peel Ritchie, the editor of the volume. Early in May occurred the lamented death of Sir James Simpson, and out of respect for one to whom they owed so much, the Society adjourned for a fortnight the meeting held on the 11th of the month, and attended the funeral in a body. I have already mentioned some of the more important of the papers he read before the Society; but when we remember that he was for years its head and chief support, and that very few meetings passed without some contribution either to the papers or to the debates from his fertile mind and fluent speech, you can realize how deeply his loss was felt.

During this session two interesting papers were produced by Dr Lachlan Aitken, an able and earnest worker, who was obliged to leave this country soon afterwards from ill health. They were entitled, "Remarks on Pelvic Peritonitis and Pelvic Cellulitis," and "On some of the Dangers attending the use of Tangle Tents." And there was a discussion on the use of Chloral, at that time a new drug, in Midwifery, both normal and abnormal, introduced in a paper by Dr Lambert of Paris. The doses there recommended

were somewhat heroic—one drachm, repeated in a short time, being the quantity commonly given.

The following session was not marked by proceedings of much interest, except a discussion on Vaccination during an epidemic of Small-pox, which followed a paper by Dr Bruce, and several contributions by Dr Duncan, the most important being his classical paper on "The Mechanism of the Expulsion of the Placenta." Dr James Young related a case of early pregnancy. The patient was fourteen years and one month old when she became pregnant, and under fifteen when she was delivered. The labour was a tedious one, but she recovered, and had a second child the following year. Dr Duncan also had met with labour in a girl under fifteen, the father of the child being only sixteen. The function of the Perineum in Procedentia Uteri was discussed in two papers—one by Dr Duncan, the other by Dr A. Milne. There was also a useful paper by Dr Peel Ritchie on the Inflammations of the Mouth in Children, with an illustrative case of Cancrum Oris. The records of these two sessions are to be found in the second volume of our Transactions.

Dr Ramsay Thomson of Dalkeith was the next President (session 33, November 1871). The session was opened by a conversazione, at which Dr Keiller delivered an inaugural address on the Progress and Aims of Obstetrics, in the course of which he paid a warm tribute to the large part Sir James Simpson had played in the advancement of both the science and art of Midwifery. The principal contributor to the work of the session, which was otherwise not a remarkable one, was Dr Angus Macdonald. He read a paper on "The Use of Barnes' Bags in the Treatment of Placenta Prævia," and another on "A Case of Shoulder Presentation where Turning was impossible, and Labour was completed by Spondylotomy." (Dr Affleck was joint-author of this latter contribution.) They were both marked by his usual thoroughness of treatment and exactness of detail.

In session 34 Dr Macdonald read a most instructive paper on Latent Gonorrhœa in the Female Sex, in which he largely supported and amplified the recently published views of Noeggerath, though he hesitated to follow that author in all his conclusions, and at a subsequent meeting he contrasted the Forceps, Turning, and Production of Premature Labour in Contracted Pelves—a paper which led to an interesting discussion. Dr Slavjansky of St Petersburg contributed two papers based on microscopical investigation, one in conjunction with Dr Duncan on a case of Uterine Polypus of an unusual character, the other on Chronic Endometritis Decidualis as a cause of abortion in some displacements of the pregnant uterus. Dr Duncan pointed out the changes undergone by the Cervix Uteri during labour, and Professor Simpson described some cases of Atresia Vaginæ.

In November 1873 (session 35), Dr Matthews Duncan was

elected President, and delivered an inaugural address of great beauty and value on the Extension and Increase of the Scientific Spirit in Medicine, in which he urged the transcendent value of scientific pursuits, and showed how apt we are to forget the two great truths, first, that "knowledge is power," useful power to the bedside practitioner; and, second, that the progress of science is the best, almost the only source of progress in the useful arts. The session was marked by a valuable practical paper by Dr Macdonald on "The Nature and Treatment of difficult Occipito-Posterior Positions of the Head, founded on an Analysis of Twenty-six Operative Cases," in which the subject was discussed in all its bearings; and a note by Dr Duncan on the Aperture necessary for the Passage of the Placenta, and for the Passage of the Accoucheur's Hand. Dr Cappie contributed an interesting case of Fibroid of the Uterus complicating Pregnancy, and proving fatal by torsion of the pedicle. With this session ends vol. iii. of the Transactions.

In session 36 (1874-5) there were several papers of importance. Dr Macdonald showed and described, with full dissection, a Diprosopus Triophthalmus Monster, of which a fine drawing is given in the Transactions. Dr Hardie made a new observation in showing the presence of "prickle cells" in the capsule of a fibrous polypus of the uterus. Dr Connel read a case of Fatal Post-partum Hæmorrhage, which was followed by a long discussion on the nature and treatment of this accident, with special reference to the use of perchloride of iron. Dr Sutugin, of St Petersburg, sent a very complete and elaborate paper on "The Means of Ascertaining the Length of Gestation by Measurements of the Fœtus and Gravid Uterus during the Second Period of Pregnancy." It was full of careful and exact measurements, and is well worthy of study. This was shortly after followed by a paper on "Contributions to the Determination of the Diminution of the Uterus after Delivery," by Dr Serdukoff, of Moscow—a paper of an equally elaborate kind. Mr Lawson Tait communicated some observations on the Enlargement of the Thyroid Body in Pregnancy, and Dr Macdonald reported a case of Puerperal Tetanus, specially dealing with the pathology of the disease. In May, Dr Foulis read a laborious and valuable paper on the Development of Cysts in the Stroma of the Ovary, in which he traversed Waldeyer's views on the origin of the cells of the membrana granulosa. Later in the session, a useful statistical paper was read by Dr James Cumming on the Uterine Souffle and the Fœtal Heart, in which he showed that there seemed to be some relation between the weight of the fœtus and the rapidity of the fœtal pulse in utero; and that for the weight per pound the pulsations are slower in the male than in the female.

Professor A. R. Simpson was our next President, and during the session which followed (1875-76) contributed largely to the work

of the Society. His first paper was an important one on "Sarcoma Uteri," illustrated by several cases. At the December meeting, at which a number of distinguished visitors were present by invitation, he delivered an inaugural address entitled "Emmenologia," which dealt exhaustively with the subject of Menstruation in all its aspects; and at a subsequent meeting he emphasized the importance of the complete evacuation of the uterus after abortion. Still later, he read a fatal case of that rare disease "Chorea Gravidarum." A case of Extra-uterine Fœtation successfully treated by Abdominal Section was communicated by Dr J. Macdougall of Carlisle. The operation was performed fifteen months after the death of the fœtus at full time; the cyst was opened and drained, no trace of a placenta being found. During the session Dr Duncan fulminated a paper against the pendulum movement in working the forceps; and read communications On the Inevitable and Other Lacerations of the Orifice of the Vagina and near it in Primiparæ, and on Rupture of the Perineum. And Dr Macdonald treated at length of Albuminuria and Puerperal Eclampsia, with comments on the nature and pathology of the disease.

The 38th session (1876-77) was inaugurated by a public meeting, at which Professor Turner, at the request of the Council, gave a valuable and instructive sketch of the Anatomy of the Placenta, embracing the researches which he had himself made within the last few years on the human placenta and that of other mammals. He pointed out in the course of the address how recent advances in our anatomical knowledge were helping to clear up many disputed points in the physiology of the placenta. At the next meeting, Professor Simpson read a report, drawn up by himself and Dr Finlay, of their visit to the International Medical Congress of Philadelphia, as delegates from the Society. Dr Duncan continued his series of researches on the Perineum in two papers, dealing with the Lacerations of the External Genital Organs, except the Hymen, during Labour in Primiparæ; and Some of the Relations of the Fœtal Head to Rupture of the Perineum and Injuries of the External Genital Organs respectively. They were illustrated by many cases, showing how frequent and numerous these injuries are. Dr Macdonald treated of the Cervix Uteri in the Later Months of Utero-gestation, combating the older views as to the taking up of the cervix into the body of the uterus, and also criticising the more recent statements of Bandl. He also related two interesting and well-observed cases of Puerperal Pleuro-pneumonia, both of which recovered. Dr Church related a case of Hemiplegia in an infant following the application of forceps during birth. Dr Engelmann, of Kreuznach, contributed an important essay on Fibrous Tumours of the Uterus, and their treatment at Kreuznach. Dr Bruce treated of the means of resuscitating still-born children; and, finally, Dr Macdonald, who contributed an amazing amount of work to the Society during this session, read his great paper on

the Bearings of Chronic Diseases of the Heart on Pregnancy and Parturition, which occupied three meetings in its recital; and at the last meeting he read a paper on the Nature and Mechanism of Spontaneous Rupture of the Uterus in its Cervical Portion.

With this session our fourth volume of Transactions ends. Since then the Transactions of each session have been brought out in the autumn following. They were at first published in paper coverings, and the first three years bound together make up the fifth volume. In 1880-81 began the annual series of Transactions as we have them now. This most important change is due to the untiring energy and business capacity of our treasurer, Dr W. Craig, who has edited all the later volumes. Before the beginning of the next session the Society suffered a serious loss by the removal of Dr Duncan to London. For though he has sent us occasional papers since, we sorely missed his constant attendance, keen criticism, and debating power, as well as the constant succession of able papers he was in the habit of communicating to us. No more valuable work has been done for the Society than that which came from Dr Duncan.

The following session, at the beginning of which Dr D. Wilson was elected President, was rich in papers of interest. Professor Simpson opened it with an address on the Treatment of Fibroid Tumours of the Uterus, in which he treated exhaustively the whole subject, both in its medical and surgical aspects. Professor Simon, of Heidelberg, contributed a paper of much interest, dealing with the operation for Vesico-vaginal Fistula; and Dr Croom read a paper of importance, treating of Retention of Urine in the Female. Dr Mundé, of New York, and Professor Schroeder, of Berlin, also sent contributions, the former on the Use of the Dull Wire Curette in Gynæcological Practice; the latter on the Condition of the Hymen and its Remains after Cohabitation, Childbed, and Lying-in, profusely illustrated by excellent drawings. Shortly after, Dr Charles Bell read a long paper on Placenta Prævia, which led to an animated discussion. The remaining papers of note were by Dr Macdonald on the Risks and Treatment of Intra-uterine Hydrocephalus as a Complication of Labour, a full and valuable commentary on the subject; and Curettes and Curetting by Dr Keiller, in some sort an answer to Mundé's contribution.

The most important feature in the next session (1878-79) was the number of papers devoted to the Anatomy and Mechanism of Labour. Chief among these were three original and valuable works by Dr Berry Hart, which are so well known and valued that I shall merely recapitulate their titles. They were—(1.) A Study of two Mesial Vertical Sections of the Female Pelvis in Relation to the Normal Support of the Uterus and Prolapsus Uteri. (2.) The Bearings of the Shape of the Fœtal Head on the Mechanism of Labour. (3.) Source of Error in the Clinical Estimation of the Elongation of the Cervix during Labour. They

were followed by Head Flexion in Labour, by Professor Simpson; Development and Structure of the Ovary, by Dr Foulis; and Spasmodic Contraction of the Lower Uterine Segment, by Dr Macdonald. Among the more practical subjects brought forward were Tarnier's forceps, then quite recently introduced, shown by Dr R. Bell of Glasgow. Papers on the Ætiology and Treatment of Puerperal Fever, by Dr Baird; some of the Causes of Sterility, by Professor Simpson; and the Use of the Volsella in Gynecology, by the same author. Dr Keiller read a report of the cases at the Maternity during his term of office. These reports have since formed a regular part of the Society's Transactions.

In session 41, Dr Macdonald was elected President. Dr Wilson, on vacating the chair, delivered an address, giving an interesting *résumé* of the advance of Obstetrics during the forty years of the Society's existence. Dr Hart continued his series of scientific papers, by communications on the Position and Distension of the Female Bladder; and Sacro-pubic Hernia, otherwise known as Prolapsus Uteri.

Dr Croom discussed the Causation of some Primitive Face Cases. Dr Duncan sent a valuable contribution on Intra-uterine Puerperal Coagula; and Professor Simpson introduced the Basilyst, with a paper describing its objects and uses, and another paper on Axis-traction Forceps; and Dr Macdonald reported some cases of Parametritis, with Observations on its Diagnosis and Treatment. Towards the end of the session, Puerperal Septicæmia was fully discussed, papers on the subject being presented by Dr Macdonald and Dr M'Raild.

The following session was less prolific than the two preceding ones, but it contained the first serious notice to the Society of the application of the Listerian principles to obstetric practice; this was contained in a paper by Dr Croom, entitled "The Systematic Use of Antiseptics in Midwifery," in which he described in detail the methods he employed in the Maternity and in private practice. Dr Macdonald related two interesting cases of Chronic Inversion of the Uterus and their successful treatment; while Dr Hart read a paper on the Shape of the Empty Female Bladder. Dr Leith Napier contributed some statistics to the study of Puerperal Temperatures, and Professor Simpson described his first case of Porro's operation.

In session 43 (1881-82), Professor Simpson was called to the Chair for the second time. The session was not a specially brilliant one, but there were interesting papers on a difficult Face Case, by Dr Milne Murray; case of Pregnancy at the age of 62, by Dr W. R. Kennedy, where the evidence was carefully given. Graviditas Serotina et Præcox, by Dr Peter Young; Funic Hæmorrhage during Labour, an elaborate paper by Dr Croom; some points in the Physics of the Bladder and Rectum, by Dr Hart; and a valuable contribution on the Diagnosis of Advanced

Extra-uterine Gestation after the Death of the Fœtus, by Dr Barbour.

The following session the President delivered an inaugural address, which was mainly devoted to some recent literature on the History of the Chamberlens and the invention of the Forceps. The most notable paper was a long contribution to our knowledge of Extra-uterine Gestation, by Dr Freund. Dr Croom continued his series of papers on the Bladder during Labour and the Puerperium; and Professor Simpson reported further experience with the Basilyst. Dr Peter Young, in a useful practical paper, discussed the subject of Dangerous Hæmorrhage from the External Genital Organs during and after Labour; and Dr Hart dealt with the Anatomy and Ætiology of Rupture of the Peritoneal Portion of the Vagina during Labour. During this session, a Pathological Committee was appointed to consider a report upon any pathological specimens that might be referred to it.

Session 1883-84 was opened by a valedictory address from Professor Simpson, who vacated the chair in favour of Dr Connel, of Peebles. The session was notable from the number of surgical papers which were read during its course. Thus Dr Macdonald contributed two cases of Extra-uterine Pregnancy, one of which was successfully treated by laparotomy, and was remarkable for the boldness of the surgery employed. Professor Simpson recorded a second case of Porro's operation; Dr Arnott, of Bombay, three cases of Cæsarean Section; Dr Chapman, the removal of a pair of Cystic Fallopian Tubes; and Mr Skene Keith, six cases of Trachelorrhaphy. Among the other workers of the Society Dr Barbour stands first with a valuable contribution to the Anatomy and Relations of the Uterus during the Third Stage of Labour and the First Days of the Puerperium. Dr Macdonald and Dr Matthews Duncan contributed papers on Lupus of the Female Generative Organs; and Dr Leith Napier wrote on Puerperal Albuminuria—a paper which gave rise to considerable discussion. In addition to the quarterly reports from the Maternity, the volume of Transactions for this session was enriched by records of the more interesting and important cases which had occurred in the Infirmary wards of Professor Simpson and Dr Macdonald, and some notes on Labour in Central Africa by Dr Felkin.

The session 1884-85 opened with a scholarly and thoughtful address by the President, Dr Connel; and a winter full of good work followed. There was a highly scientific and yet practical paper on the Prevention of Lying-in Fever, by Dr Vassily Sutugin, of St Petersburg; and Dr Ballantyne showed us, for the first time, Sphygmographic Tracings from cases of Puerperal Eclampsia. Dr Barbour added two papers to the Physiology and Pathology of the Third Stage of Labour; while Dr F. Simmons gave an account of some of the rarer forms of Malignant Disease of the Female Sexual Organs which had been recently observed in

Professor Simpson's wards. Surgeon-Major Arnott related his experience in Craniotomy at the Jamsetjee Jejeebhoy Hospital in Bombay. In the domain of Surgery Dr Macdonald described two interesting operations, the one a Porro-Müller, the other the removal of the Pregnant Horn of a Bifurcated Uterus.

The following session (47th), Dr Halliday Croom was elected President, and Dr Connel delivered, in leaving the chair, another eloquent and philosophical address. At the second meeting there was a general discussion on Micro-organisms in relation to Puerperal Fever, with special reference to Antiseptics, introduced in a paper with that title by Dr Barbour. Dr Hare (now of Manchester) made an interesting contribution to the debate from the point of view of the bacteriologist, and many of the Fellows joined in the discussion. Later in the session, Dr Symington, in a paper on the Position of the Uterus and Ovaries in the Child, made a valuable and original contribution to Anatomy; and Dr Milne Murray's elaborate and laborious paper which followed on some of the Physiological and Therapeutical effects of Water at different Temperatures, with special reference to Obstetrical and Gynecological Practice, was well worthy to be ranked with it. Professor Simpson made a gallant effort to provide a common nomenclature in Obstetrics, and Dr Croom discussed "Fibrous Polypi Complicating Labour," and "Post-Partum Vaginal Hæmatoma," in two excellent papers. During this session the Society sustained a great loss in the death of Dr Angus Macdonald,—a man of great powers, untiring industry, and firm will, who had forced his way to the very forefront of the profession by the abounding energy with which he carried out anything to which he put his hand, and the clear and comprehensive mind which directed all his efforts. His manly and kindly nature made him beloved by all with whom he had to do.

Session 48 (1886-87), which was opened by an address by the President, in which he fully discussed and justified the removal of the appendages, and defined the cases in which the operation is appropriate, was chiefly noteworthy for the contributions to Anatomy and Physiology from Dr Barbour and Dr Hart. The former read a series of elaborate papers on the "Sectional Anatomy of Labour," in which much new ground was opened up; the latter in conjunction with Dr Carter, in a paper which bids fair to become classic ground, described most accurately the Sectional Anatomy of Extra-uterine Gestation. He made also a contribution to Anatomy of the Post-partum Uterus, with special reference to Placenta Prævia. Among the practical papers was one by Dr Croom on the "Indications for and Methods of Washing Out the Puerperal Uterus," and another by the same author, giving an account of a series of Abdominal Sections. Dr Brewis contributed a case of Spontaneous Inversion of the Uterus, and Dr Talent a case of Chorea Gravidarum. Dr Foulis made an able contribution to

the question of Axis-traction Forceps, and presented an instrument on an entirely original plan.

I am now approaching the end of my task, and it only remains for me to remind you of the work that has been done since the time, two years ago, when you did me the honour to elect me your President. These two sessions, I am proud to think, show as good a record as most which have gone before them. Dr Croom's valedictory address was, as might be expected, full of weighty matter well put together, and in the course of the session of 1887-8 we had papers dealing with that very serious complication, Mitral Stenosis in Labour, by Drs Hart and Ballantyne, the latter illustrating his work by some excellent sphygmographic tracings. Dr Barbour presented a criticism of the works of others, and an able defence of his own views on the Third Stage of Labour. Dr Duncan sent us a valuable contribution, opening up a little-worked field—namely, the relation of Alcoholism to Gynæcology and Obstetrics. Dr Foulis came forward with a new theory on the Causation of the Position of the Fœtus in Utero, and Drs Croom and Brewis gave proofs of their skill and success as operators in statistical papers recording their practice in Laparotomy. Again, the Society is indebted to Dr Barbour for a scholarly study of the history of the contributions of the early Anatomists to Obstetrics. Dr Currie also read some interesting notes on the Obstetric History of two Queens of England. Dr Milne Murray described and demonstrated the action of Galvanism on the Tissues, and recounted some experiments on the effects of Compression on the Fœtal Skull; and Dr Ballantyne read a contribution to the Anatomy of the Labia Minora and Hymen.

During last session we had several excellent papers, dealing with the Third Stage of Labour from the physiological as well as from the practical standpoint, by Dr Hart and Dr T. A. Helme; and one on the Mechanism of Labour, by Dr Barbour. Dr Symington again favoured us with a valuable contribution on the Normal Anatomy of the Female Pelvic Floor, which was followed by a paper on the same subject by Dr Hart, in which his well-known views were ably restated and confirmed. This brought on an interesting discussion, not without considerable differences of opinion. Dr Felkin related some cases of Fœtal Malaria as he had met with it in the East; and, in another paper, discussed the relationship existing between the advance of Civilisation and the increase of Sepsis. Two contributions to the study of Heart Disease in relation to Labour were read by Dr Hart and Dr W. F. Wright. Dr Haig Ferguson reported some interesting cases of a variety of Post-partum Shock, and propounded a theory in explanation of them. Dr G. O. Mackness described an investigation he had made on the relative Weights of the Placenta and the Child, and reported his results. Dr Leith Napier, in a speculative paper, discussed the relationship between Neuralgia and Abortion; and, finally, Dr

Croom gave an analysis of 130 cases of Abdominal Section, with remarkably successful results.

In the foregoing account of the work of the Society, I have necessarily omitted any notice of by far the larger part of the papers and proceedings. I have but skimmed over the surface and taken off some of the cream, leaving behind an enormous quantity of material on which there was no time to enlarge. There are among the records endless papers and discussions on individual cases, or groups of cases, of all the common accidents and complications of labour, and of the ordinary and extraordinary injuries and diseases which come into the domain of Gynæcology, and of the medicinal and operative treatment necessary for their cure. I have said nothing of the exhibitions of morbid specimens and monsters; little of the production of new instruments—such as forceps, cephalotribes, specula, of which there has been not a few; or pessaries, of which there have been dozens. I do not undervalue such work—far from it—but there was not room for each to be separately mentioned, and I have endeavoured to pick out those which seemed to be of most permanent interest, or from their more general and scientific character to be most likely to leave their mark upon the future of Obstetrics. For, be it remembered that scientific observations and experiments, though they seldom react immediately upon practice, have a great influence in the long run; they gradually make their way into the text-books, and take their place among the lectures of the teachers, and thus become, by degrees, incorporated as part and parcel of the accepted doctrines of the time.

And if we ask, What is the outcome of it all, what great changes and improvements in our art can you point to as the result of this fifty years of eager work? I would say that in the domain of Midwifery we have found in ether and chloroform a means of alleviating the worst pangs of labour, of subduing convulsions, and of rendering infinitely less difficult those operations which we are all called upon now and again to perform. Indiscriminate bleeding has been abolished. The forceps, no longer regarded as a weapon scarcely less deadly than the perforator, has been found to be a beneficent instrument for the relief of tedious labour and the saving of dangerous exhaustion. Turning has been rendered by the bipolar method more easy of performance, and has been called into use in many cases of distorted brim, where the infant was formerly sacrificed. We have found surer and better means for dilating the cervix and inducing premature labour. The study that has been given to the anatomy and physiology of placenta prævia has resulted in a treatment vastly more successful than was formerly the case. By more careful watching of our cases and an improved treatment we have rendered post-partum hæmorrhage both a less frequent and a less formidable accident. And last, and best of all, by the introduction of the principles of antiseptics into

midwifery practice, the dreaded fevers of the lying-in period have been to a great extent abolished from lying-in hospitals, formerly hardly ever free from them, and to a less degree from private practice.

In the domain of Gynæcology our gains have been even more striking, and here it is to the surgeons that almost all of the advance is due. Ovarian tumours, fifty years ago the despair of the physician, are now removed at an early period with almost unvarying success. The introduction of silver-wire opened up a new field in operations on the perineum and on vesico-vaginal fistulæ, which is ever widening in extent. Cæsarean section, which not so long since was almost invariably fatal in this country, is now performed by the method of Porro or of Sänger with a very remarkable degree of success. Ruptured tubal pregnancy, till recently one of the most fatal of accidents, is now attacked with marvellous results. Electricity is again coming to the front as a valuable agent of cure in those cases which it is a serious thing to leave alone, and an even more serious thing to attack with the knife. The removal of the uterine appendages—a natural deduction from a study of the physiology of the parts—has become an established proceeding in certain cases of bleeding fibroids and in other conditions.

In Midwifery and Gynæcology alike we have advanced greatly in exactness of diagnosis, and in energy and boldness in treatment.

Such are some of the most notable changes which have taken place in the *practice* of our art since this Society was established, and in not a few of them we can fairly claim our share. We have perhaps a still better claim to have helped forward the *science* of Obstetrics. Great strides have been made in the accurate knowledge of the structure of the placenta in man and other mammals; of the connexions between the bloodvessels of the mother and the fœtus; of the anatomy of the pelvis and its contents; of the uterus in the pregnant and puerperal conditions, both normal and pathological; of the anatomy and physiology of the whole process of pregnancy (whether within or without the uterus), and of labour from beginning to end.

A word or two in conclusion as to the material position and prospects of the Society. This is best shown by tabulating the numbers of Fellows at the time the Transactions first appeared, 1870; at the time when the Transactions began to appear annually; and at the present time.

	Honorary Fellows.	Corresponding Fellows.	Ordinary Fellows.
In 1870, .	30	105	109
„ 1878, .	19	103	116
„ 1889, .	37	87	306

These figures seem to show that the annual publication of the

Transactions has brought a very large addition to our numbers, and the increase has been gradual and steady. The Fellows who subscribe to receive the Transactions are not confined to Edinburgh and its neighbourhood, as was exclusively the case in 1870, but are spread over Scotland, England, and several of the colonies.

The finances of the Society are in a flourishing condition.

The office of Treasurer was at first discharged by the Senior Secretary, but in 1861 Dr James Sidey was appointed to this separate duty, after acting as Financial Secretary for several years. In 1867 he was succeeded by Dr James Young, who held office until 1875, when our present energetic Treasurer Dr Craig was appointed. He has worthily filled the office for the past fourteen years, and has brought our finances into a state worthy of a Chancellor of the Exchequer.

Our secretaries have been numerous, and we have to thank them in great measure for the Society's success. They have arranged its business, stimulated the workers, and kept the ball rolling; and they have reported and recorded all the work which has been done at our meetings.

Our library is our weak point. It has never had a fair start; and though we possess a few valuable books, and are annually adding to the volumes of periodicals by exchanges with other Societies, and occasionally receive a gift of papers or books from their authors, it is still a small and weakly growth. It is full, however, of possibilities, and I commend its condition to the Council and the Society as a subject for serious consideration during the coming session.

And now, gentlemen, it but remains for me to hand over the reins of office to a worthier successor, whose name I have had occasion so frequently to mention in the later periods of our history; and I can only hope that our progress in the future may be worthy of the traditions of the past; and that by earnest and honest labour we may succeed in reclaiming many a good piece of solid ground at present covered by the infinite ocean of the unknown.

Professor Simpson proposed, and *Dr Craig* seconded, a cordial vote of thanks to Dr Underhill for his address.

II. EXFOLIATION OF THE BLADDER IN THE FEMALE.

By F. W. N. Haultain, M.D.

I have been induced to bring before the Society a few remarks upon this somewhat rare condition by a case which came under my observation in the Royal Infirmary, Edinburgh, while I there acted as clinical gynæcological clerk under Dr Halliday Croom.

The facts of the case may be briefly stated as follows:—Mrs M., æt. 26, iv.-para, was admitted into Royal Infirmary on 10th

April 1887, complaining of inability to retain her urine, and also of a large painful swelling in the abdomen. Both of these symptoms had troubled her for about a month; the abdominal swelling, however, was rapidly increasing, and her general health was daily becoming weaker. She had not been unwell for four months, and thought that probably she was pregnant.

On examination the patient was found to be suffering from an incarcerated gravid retroposition of the uterus, with retention of urine. Upon passage of the catheter 100 fluid ounces of highly offensive porter-coloured urine were withdrawn, coincidently with which the abdominal tumour, which reached to 2 inches above the umbilicus, entirely disappeared. With difficulty the malplaced uterus was returned to its normal position, but unhappily the necessary manipulation to accomplish this induced abortion, which took place on the following day.

With the exception of total inability to retain her urine the patient made an uninterrupted recovery, and left the hospital on the 17th May; the only treatment adopted being the regular washing out of the bladder with antiseptic solutions. A week after (25th May) patient was readmitted suffering in a similar though more severe manner, to what she had done on her previous admission. Upon examination the abdominal swelling was found to have reappeared, but projecting from the vulva was felt a membranous mass, which upon inspection proved to be protruding from the urethra, and was evidently causing retention of urine, thereby accounting for the abdominal swelling. A catheter was therefore passed along the side of the mass into the bladder, and 96 fluid ounces of fœtid urine withdrawn. Thereafter, by gentle traction upon the mass its removal was effected. The catheter was again passed up to the ring, and could with ease be moved in all directions.

With the exception of being in a somewhat critical condition on the evening of the removal of the mass, the patient made an uninterrupted recovery, and left the hospital on 12th August. At no time, however, was she able to retain her urine. The only treatment adopted was persistent washing out of the bladder with antiseptic solutions.

I again saw her eighteen months after, when she said, she never felt in better health, her only trouble being her water, which continued to dribble. On examination at this time, her urethra was found to be sufficiently patent to allow of the introduction of the forefinger with ease. The sound now, however, passed only 4 inches into the bladder.

On examination of the exfoliated mass which I have already shown to the Society, it was found to measure 14 by $7\frac{1}{2}$ inches at its broadest diameters, and was from a fifth to an eighth of an inch thick. The outer surface (with the exception of a white, smooth, glistening portion $1\frac{1}{2}$ inches square) was rough, brown, and soft,

while the inner was gray and gritty like sandpaper. Microscopically it proved to be a *true* membrane; and at all points three layers could be distinctly recognised, viz.:—1. Crystalline granular; 2, Transverse muscular; 3, Longitudinal muscular. While further, on section of the smooth glistening portion above mentioned, two more layers were superadded, viz.:—(*a.*) An old connective tissue layer; (*b.*) A new connective tissue layer.

All the above tissues, with the exception of the new connective tissue layer, were in a state of far advanced degeneration, and were densely infiltrated with granular degenerating cells and broken down hæmorrhagic foci. The bloodvessels also were widely distended with degenerating material. In fact, the membrane was nothing more or less than the entire thickness of the bladder-wall in a state of coagulative or hyaline necrosis, with, at the special portion already mentioned, a piece of the peritoneal covering attached.

This somewhat startling state of affairs is by no means unique, cases having been published in detail by Spencer Wells, Krukenberg, Madurovicz, Schatz, and others, under the misleading title of Exfoliation of the Mucous Membrane of the Bladder. These, I may add, agree in the utmost detail with the appearances of the specimen I have just described, the entire thickness of the wall of the organ having been shed.

A number of other cases have also been recorded, in which the mucosa and submucosa have alone been cast off (Luschka, Aveling, etc.) (See Table.) In all these where microscopic detail has been gone into (this unfortunately but seldom) the description agrees essentially with that of my specimen, in so far as there could be made out dilated engorged bloodvessels, and a degenerated and infiltrated condition of the tissues involved.

In spite, however, of these detailed cases, the greatest variance seems to exist as to the nature of these exfoliated membranes—many (among whom are well-known authors of gynæcological text-books) describing them as merely croupous exudations or false membranes.

This may be accounted for by the superficial manner in which many exfoliated membranes have been examined, the mucosa and submucosa being so much altered that any appearance of the normal tissue is quite unrecognisable. That a croupous or exudative inflammation of the bladder with exfoliation of the false membrane does occur, I, of course, do not for a moment deny, but to describe as such the condition I have just detailed is, I consider, erroneous.

If great difference of opinion exists as to the nature of the exfoliated sac, it is eclipsed by the variety of reasons which are assumed as to the ætiology of the lesion. Some of these may here be quoted, viz.:—1. Destructive action of the decomposed urine on the bladder wall. 2. Inequality in the elasticity of the various vesical coats causing tearing of the tissues during distension. 3.

Direct equable pressure of the retained urine on the bladder-wall interfering with the circulation. 4. Interference with the arterial supply by extraneous pressure. Doubtless any of these assumptions at first sight seem feasible, but unfortunately none of them are applicable to all cases, and therefore are untenable. Thus the first three can in no wise explain the cause in these cases (published by Wells, Boldt, and Mauer) where no retention of urine existed, while the fourth (Pinard and Varnier[1]), I hope, I will also be able to prove is short of the mark.

To what, then, must we look as an elucidation of the cause? Obviously, I think (if we accept that the condition is one of necrosis), to interference with the circulation. To arrive at a conclusion on this point one must naturally consider, first, the normal circulation of the bladder, and, second, the cases in which exfoliation has been met with. By this means it will be ascertained if there be anything which can so act upon the circulation of the organ as to cause this lesion.

I will not usurp the time of the Society by detailing the circulation of the bladder, as that must be known to all, but shall broadly state the important fact, that the entire circulation of the organ, arterial and venous, passes to or from the organ through vessels situated at the base and neck—that is, through the fixed portion of the bladder.

With regard to the second point, the cases published occurring in females have all been associated with either of two conditions —retention of urine or labour. The retention of urine, as is shown in the Table, being due, in all cases but one, to incarcerated retroposition of the gravid uterus. That retention of urine alone is sufficient to cause death of the bladder wall has been proved by May of Giessen, by a series of experiments on dogs published in a thesis by him, to which I must refer if details are wanted.[2]

When the condition is due to retention of urine, I consider it is brought about by the pressure of the retained column of urine upon the veins of the neck of the bladder, preventing the return of blood from the organ, and thus setting up a condition of stasis, with coincident congestion, exosmosis, and diapedesis, and subsequent coagulation and degeneration of the effused blood. That the pressure is on the veins of the neck and not on the vessels in the wall of the organ (as suggested by May) is borne out by the fact, that everywhere throughout the walls there are found hæmorrhages, engorged vessels, and cellular exudation, quite the reverse from what would be expected if the pressure had been directly applied. Again, the neck being the fixed portion, an external counterpressure is afforded to that of the distension of the retained urine, a condition not met with in other parts of the organ.

[1] *Annales de Gynécol. et d'Obstet.*, 1886.
[2] *Inaugural Dissertation.* Giessen, 1869.

TABLE OF RECORDED CASES OF EXFOLIATION OF THE VESICAL MUCOUS MEMBRANE IN THE FEMALE.

A.—*After Labour.*

		Description of Sac.	Result.	Reference.
1	Wells*	Entire coats of bladder and at parts peritoneum	Recovery	*Path. Trans.*, Lond., 1863, vol. xv., p. 140.
2	Wells	Mucosa, submucosa, and degenerated muscle	Death	*Path. Trans.*, Lond., 1863, vol. xv., p. 140.
3	Martyn	Mucosa, submucosa, and some muscle	Recovery	*Path. Trans.*, Lond., 1863, vol. xv., p. 137.
4	Barnes	?	Recovery	*Medical Times*, 1861, vol. i., p. 186.
5	Bell	Mucosa	Recovery	*Edinburgh Medical Journal*, 1875.
6	Hewitt	?	Recovery	*Obstet. Trans.*, Lond., 1883.
7	Aveling	Mucosa	Recovery	*Obstet. Trans.*, Lond., 1883.
8	Boldt*	Mucosa, submucosa, and muscle	Death	*American Journal of Obstet.*, 1888.
9	Mauer*	Mucosa, submucosa, and muscle	Recovery	Thesis, Berlin, 1881.
10	Doran	Mucosa, submucosa, and muscle	Recovery	*Obstet. Trans.*, Lond., 1881.
11	Krukenberg	Mucosa, entire muscularis, and a large portion of peritoneum	Death	*Archiv für Gynæcologie*, vol. xix., 1882.
12	Specimen in Univer. Coll.	Mucosa, submucosa, and muscularis	Recovery	Specimen, 1466.
13	Phillip	?	Recovery	*British Medical Journal*, 1871.

B.—*Due to Gravid Retroposition of Uterus.*

14	Godson	?	Recovery	*British Medical Journal*, 1871, vol. ii., p. 432.
15	Wardell	?	Recovery	*British Medical Journal*, 1871.
16	Schatz	Mucosa, submucosa, and entire muscular wall	Death	*Archiv für Gynæcologie*, vol. i., p. 469.
17	Moldenhauer	Mucosa, submucosa, and some muscle	Death	*Archiv für Gynæcologie*, vol. vi., p. 108.
18	Frankenhauser	The greater part of the entire bladder wall with peritoneum	Recovery	*Archiv für Gynæcologie*, vol. vi., p. 77.
19	Luschka	Mucosa and submucosa	Death	*Virchow's Archiv*, 1854, p. 30.
20	Brandeis	Mucosa	Recovery	*Archiv für Gynæcologie*, vol. vii.
21	Maunder	Almost entire bladder	Recovery	*Med. Times and Gazette*, vol. ii., 1863, p. 522.
22	Zeitfuchs	?	Recovery	Siebold's *Journal für Geburtshülfe*, 1833.
23	Wittich	Mucosa with portion of muscle	Recovery	Siebold's *Journal für Geburts.*, 1833.
24	Hausmann	Mucosa	Recovery	*Monatsch. für Geburt.*, 1868, vol. xxxi., p. 132.
25	Madurowicz	Entire thickness of bladder with portion of peritoneum	Recovery	*Wiener Med. Wochensch.*, 1877, Nos. 2 and 3.
26	Hurry	Mucosa and submucosa	Recovery	*Edin. Med. Jour.*, 1884, p. 1000.
27	Pinard & Varnier	Mucosa, submucosa, and muscle	Death	*Annales de Gynecol. et d'Obstetriques*, 1886.
28	Walters	?	Recovery	*Obstet. Transactions.*
29	Baynham	Mucosa	Recovery	*Edin. Med. and Surg. Jour.*, 1830, vol. xxxiii., p. 156.
30	Ritter	Mucosa and submucosa	Recovery	*Vierteljahrschrift für heilkunde*, Prague, 1844, p. 37.
31	Klein	Mucosa, submucosa, and muscle	Death	Inaugural Dissertation, Berlin, 1880.
32	Rosenplanter	Mucosa and submucosa	Recovery	Inaugural Dissertation, Dorpat, 1856.
33	Haultain	Mucosa and submucosa, and entire muscle with portion of peritoneum	Recovery	

C.—*Due to Impaction of Fœtal Head in Pelvic Brim before Labour.*

34	Whitehead	Mucosa, submucosa, and muscle	Recovery	*British Medical Journal*, 1871, vol. ii., p. 432.

Those marked * had no retention of urine.

That the pressure is sufficient only to primarily constrict the veins, and not the arteries, may safely be assumed:—*First*, from the want of blood-pressure in these vessels; *second*, from the slight resiliency of their walls; and, *third*, from their superficial situation. Further, as in our cases an impacted mass in the pelvis will greatly assist the compression of the vessels, by both pressing directly upon them, and also offering a more marked resistance to the pressure of the retained urine on the bladder neck and base.

That an impacted pelvic mass alone is the primary cause of compression of the vessels, as suggested by Pinard and Varnier, is negatived by a case of necrosis of the bladder with gravid retroposition of the uterus which came under my notice. In this case the patient died twelve hours after the urine had been withdrawn, while the retroposed uterus remained *in situ*, yet on microscopical examination of its walls a few of the vessels were found to contain fresh blood, while here and there were absolutely fresh extravasations of blood corpuscles—evidence of a partial return of the circulation.

With regard to those cases met with independent of retention of urine, all have been the result of labour. In these, the cause, though essentially the same (viz., pressure upon the vesical neck), differs in the fact that here not only have we the veins compressed by the advancing fœtus, but the arteries also. By this means the circulation through the organ is entirely arrested, and a state of anæmia of its walls results.

From this temporary anæmia of the organ, such retrogressive changes occur in the vessel walls, that upon the re-establishment of the circulation we have acute exosmosis and diapedesis, this being followed by the usual process of coagulation and degeneration of the exuded lymph, and death of the tissues. In fact, we have simply a more acute form of the same process which occurs on prolonged blockage of the veins. That this is more than theory the experiments of Heubner,[1] Leipzic, have proved. He, recognising the peculiar circulation of the bladder in rabbits, was able, by throwing a ligature round the neck of the organ, to entirely arrest the circulation, with the result, that, on allowing the circulation to proceed after two hours' stoppage, a condition was set up entirely similar to what I have just stated.

Here, then, we have seemingly a satisfactory explanation of all cases, viz., compression of the vessels of the neck of the bladder. In the retention of urine cases the circulation is arrested by compression of the veins alone, while in the labour cases both arteries and veins participate. In the former the process is slow and prolonged, in the latter it is acute and rapid.

The question then naturally arises, If such be the cause, how are examples of this lesion not more common, labours being of

[1] *Die expérimentellen Diphtherie.*

hourly occurrence, while retention of urine is by no means rare? To the first I can only say, it must be due either to some abnormal mechanism, such as the head passing through the brim in the conjugate diameter, and thus compressing the base and neck of the bladder against the pubic symphysis, or to a displacement of the bladder due to rotation of the uterus, by which means the base and neck of the bladder become squeezed between the side wall of the pelvis and the head normally entering in the oblique of the pelvic brim. As regards its infrequency in cases of retention, this may be explained, first, by the long and excessive retention necessary, the shortest recorded case being four days; and, secondly, that in our cases it is favoured by the coincidence of a pelvic mass in close relation to the neck and base of the bladder, which may act primarily as a "point of resistance" to the distension of the organ; and, secondarily, by itself assisting to compress the vessels.

As regards the nature of the receptacle for the urine which remains after the bladder has been shed, the condition is one of great interest. It is formed primarily around the necrosed organ by the agglutination of the surrounding organs to one another by inflammatory exudation of lymph, which later becomes vascularized and formed into new connective tissue—a line of demarcation eventually forming, and the necrosed mass being cast off as a slough. Examples of this condition have been met with post-mortem, and described by Schatz, Krukenberg, and Moldenhauer. In all, the remaining sac consisted entirely of connective tissue. That such has been the compensatory process in my case evidently accounts for the small white glistening portion on the external surface of the exfoliated membrane, which was microscopically made out to be composed of young fibrous tissue, this being probably a portion of the secondary sac which had been torn off during the process of expulsion. That the secondary or remaining sac is of no mean calibre will, I think, be evident when it is remembered that during the expulsion of the necrosed bladder it contained 96 ounces of urine, and formed a tumour which reached up to the level of the umbilicus.

Another point of great interest in connexion with this condition is the comparatively small number of fatal cases met with, viz., only 8 out of 33, a most striking example of the restorative tendency of Nature. The cause of death in all, with one exception, was exhaustion. In this one case (Krukenberg's), death was the result of extravasation of urine into the peritoneal cavity through a rupture in the secondary sac, which occurred ten days after exfoliation, a condition directly caused by the supervention of abortion. The cause of rupture in this case is, I think, easy of explanation, when it is remembered that the secondary sac is founded upon the agglutination of surrounding organs, of which the uterus is one of the chief. Necessarily, then, upon abortion occurring a great diminution in the size of the uterus would

take place, by which means the relations of the sac would be seriously interfered with, and tearing result.

Although death seldom occurs, future urinary incontinence is seldom absent in these cases in which the muscular wall has been shed; in some of these even a certain amount of retentive power remains, which must be attributed to non-involvement of the sphincter urethræ—the act of micturition being performed by the aid of the abdominal muscles alone. In these cases where only the mucosa and submucosa have been involved, entire restitution of the power of the organ is the usual sequence. As regards treatment, beyond frequently washing out the bladder with antiseptic solution nothing can be recommended.

Before closing, let me crave the leniency of the Fellows of the Society for the somewhat superficial nature of this contribution, but the details are so numerous that I feel that to go thoroughly into them would unnecessarily occupy the limited time at your disposal.

Dr Halliday Croom thought Dr Haultain deserved the highest praise for his most original communication. The question of exfoliation of the bladder was a matter well recognised, but its real nature was not quite so well understood. Hitherto such cases had been described as exfoliation of the mucous membrane alone. From the cases recorded by Dr Haultain it would seem apparent that in them, at least, not only did the mucous membrane exfoliate, but that the gangrene spread to the muscular and peritoneal tissues, and that they exfoliated and were expelled as well. This much, apparently, Dr Haultain's cases established. It seemed to him (Dr Croom) that the most remarkable part, however, of his investigation consisted in his description and suggestion of what the bladder-wall then was if both its mucous muscular and peritoneal tissues were wanting. It was difficult to see how the walls could consist merely of agglutinated tissues, the walls of other organs, vascularized membranes, etc. That, in the meantime, must remain an open question. Dr Haultain's suggestion as to etiology of the condition, viz., that it is not due to pressure from without, as hitherto averred, seems to be the only explanation which applies to all the recorded cases. He attributes the condition to retention of urine, the pressure being greatest at the base where the vessels enter, and where there is most resistance. Whatever might be the ultimate explanation of these remarkable cases, the work brought before them to-night was both interesting and original.

Dr Milne Murray had listened to Dr Haultain's paper with much pleasure and interest. He thought Dr Haultain had made out a very strong case in support of his view that the bladder had really come away in its entire thickness, though at the same time it was difficult to realize the nature of the sac which took its place, and which apparently performed all the functions of a bladder.

Dr Murray thought that Dr Haultain's explanation of the mode in which the necrosis occurred was quite sound. The limited area through which the bladder received its vascular supply, and the directness with which pressure could be brought to bear on this portion, was quite sufficient to account for it. The paper was a valuable and most suggestive one, and indicated an important field of inquiry.

Dr James Ritchie asked if any of the patients reported to have recovered after exfoliation of the whole thickness of the bladder-wall had since died, and if the nature of the new bladder-wall had been ascertained by post-mortem examination.

Dr Berry Hart had listened with great interest to Dr Haultain's valuable paper, but he did not think it possible for the bladder to slough in its entire thickness, as Dr Haultain alleged.

MEETING II.—DECEMBER 11, 1889.

DR BERRY HART, *President, in the Chair.*

I. *Professor Simpson* exhibited—(1.) A FŒTUS WITH CONVOLUTIONS OF THE UMBILICAL CORD. The fœtus had reached the fourth month of intra-uterine life. The cord passed from the umbilicus to encircle the left arm of the fœtus, which was found lying behind the neck, it then passed round the right arm a little below the shoulder, again it encircled the left arm, and finally it passed round the neck of the fœtus from right to left before passing to its insertion in the placenta. The fœtus was partially macerated. (2.) An EXOMPHALIC FŒTUS which had been sent to him by Dr George M'M. Brown of Hanley, Staffordshire, who had furnished the following notes of the case:—Mrs S., aged 32 years, multipara, married in 1878, and was confined of her seventh child on 23rd November 1889. Menstruation began when she was only 13 years old, was of the 28 day type, had a duration of from four to five days, and was normal in quantity. The date of the last menstruation was 13th March 1889. Four and a half months after this date quickening was first felt, and the movements of the child were felt at intervals from that period during gestation until ten hours before the birth of the child. She had a yellowish-coloured discharge, which came on three months before she became pregnant, and which continued until the birth of the child. From the middle of gestation she complained of a pain in the left iliac region, which gradually ascended as gestation advanced, until at labour it had reached the lower part of the left abdominal region. This pain was much exaggerated and very severe during labour, so that she could not allow the bed-clothes to rest on the part, and com-

plained of the weight of the clothes making the pain worse. Otherwise her health was good during pregnancy. Since delivery she has been entirely free of the pain. Her previous confinements were all easy, none exceeding six hours in length, although all the children were very large. In the case of this confinement labour began at 3 A.M., but the pains were very slight. The membranes ruptured at 11 A.M. Very profuse flooding set in at one o'clock the same day, and at this time the pain in the left abdominal region was very intense. A midwife was in attendance, but Dr Brown was called in immediately after the flooding set in. A foot and a hand presented, but at the same time there was felt, on further exploration, something which resembled the placenta; but on further examination, and only when the child was partially born, it was found to be the abdominal viscera. The child was delivered by traction on the foot and leg, and although the traction was not excessive, the foot came off. With the exception of a little febrile disturbance, the mother did well. The fœtus showed, in addition to the well-marked exomphalic condition, a double hare-lip and cleft, diaphragmatic hernia, and a stunted condition of the right arm, and irregularity in the development of the fingers and toes. Near the lower end of the vertebral column was a small projection, which seemed on palpation to contain the tip of the sacrum, and this projection was attached by bands (probably amniotic) to the margin of the deficiency in the anterior abdominal wall. The child was a male, but the penis was imperfectly developed, and there was no anus. The large intestine was abnormally long and had a wide lumen. (3.) *Professor Simpson* also exhibited (for Dr Robert Stewart) a DIMIDIATE PLACENTA.

II. *Dr Underhill* exhibited—(1.) A piece of a large MUCOUS POLYPUS which had been expelled spontaneously during a monthly illness. The patient had been suffering for a long time from menorrhagia and profuse inter-menstrual leucorrhœa. The piece expelled looked as if it had been cut through with a knife or a wire, but this was not the case, and it was not at all clear to what cause the separation was due. (2.) An OVUM which was thrown off at the sixteenth week, exactly at the time the fourth monthly period would have been on, had the patient not been pregnant.

III. *Dr Brewis* showed—(1.) A FIBROID TUMOUR which he removed from a lady a few days ago. The patient is 45 years of age, and has suffered for about a year from severe pain in the back, especially at the menstrual periods, from menorrhagia, metrorrhagia, and leucorrhœa. Latterly, in addition to these symptoms, she has had retention of urine, for which she was compelled to call in her medical attendant, who discovered the tumour. The fibroid was an interstitial one, growing in the substance of the posterior lip of the cervix, filling up the pelvic brim and the upper part

of the vagina. The surface of the swelling was continuous with the posterior vaginal wall. The anterior lip of the cervix was drawn out, thinned, formed a semicircle on the anterior surface of the swelling, and was felt above the symphysis pubis. The uterine body was enlarged, the sound passing in a distance of 5 inches from the anterior lip of the cervix, and was of fibroid consistence. The tumour was removed by enucleation. A crucial incision was made over its anterior surface; after cutting through cervical tissue of the depth of half-an-inch, the capsule was reached, and the tumour removed bit by bit with scissors. The bed of the tumour was stuffed with cotton wool dipped in colloid styptic, and the vagina was plugged with salicylic wool. The tumour was entirely cervical. (2.) TWO VAGINAL CYSTS removed from a patient whose chief symptoms were dysuria and discomfort in walking. (3.) DISEASED UTERINE APPENDAGES. Both tubes are thickened. One ovary is large, essentially cystic, and shows a well-marked corpus luteum; the other ovary is small and cirrhotic. These ovaries suggest, as Dr Brewis has before pointed out, that cirrhosis is sometimes a later stage of hydrops follicularum. (4.) DISEASED UTERINE APPENDAGES from a patient who had recurrent attacks of acute peritonitis, and a history of specific infection. Both tubes are greatly thickened, one of them is firmly agglutinated to its ovary by lymph of somewhat recent origin. All the above patients did well.

IV. NOTES ON HEART DISEASE IN PREGNANCY AND LABOUR.

By G. OWEN C. MACKNESS, B.A. (Oxon.), M.D., Broughty Ferry.

THE subject of heart disease complicating pregnancy has lately on more than one occasion occupied the attention of our Society. In October 1887 Dr Berry Hart read a paper on mitral stenosis as a complication, giving at the same time the reports of two cases which had been under my own care; while on the same date Dr Ballantyne fully recorded another similar case. Three other cases were recorded by Dr Berry Hart in May 1889, and one by Dr Fraser Wright in last July. The subject is of such importance that I need hardly apologise for relating at some length the following case, which was treated in the Edinburgh Maternity Hospital during the time that I was Resident Physician. The case, which was under the care of Dr Halliday Croom, to whose kindness I am indebted for permission to lay these notes before you, was one of pregnancy complicated by aortic stenosis and incompetence, together with mitral stenosis and incompetence.

Jane C., aged 24, i.-para.

History.—Her mother is still alive and well; no history as to

father. When about 10 or 11 years old she had scarlet fever and measles, followed immediately by small-pox; from these she recovered well. She does not know that she has ever had rheumatic fever, but has suffered at times from pains in her wrists. She has always been fairly strong, but as a general servant she has done a great deal of hard work. About two or three years ago she noticed that her feet were swollen at nights; this condition, however, passed off without treatment. At the end of 1886 she began to be troubled with shortness of breath and palpitation on making any exertion. In the beginning of January 1887 she caught a cold which kept her in bed for a day; there were no special pains in the joints. She last menstruated on 9th January 1887. About this time she had severe pain in her left side, which soon improved; but in the beginning of April it returned, and she was admitted into Dr Affleck's ward, Royal Infirmary, Edinburgh, on 8th April, complaining of shortness of breath and pain in her left side, the pain being shooting in character and often passing up into both shoulders. At the time of her admission into the Infirmary she suffered a great deal from giddiness, with pains in her head. She never had any morning sickness.

I am indebted to Dr Affleck's kindness for the following notes of her condition while in his ward:—

Circulatory System.—Pain severe in left mamma; slighter pain on inner side of right mamma; slight palpitation; dyspnœa, especially at night; visible pulsation in episternal notch and beating of carotids; apex beat in fifth interspace, about 2 inches from sternum, feeble, and with no thrill; slight thrill between second and third interspaces; slight thrill in episternal notch. Heart not enlarged. Over mitral area the first sound is replaced by a soft blowing murmur, which is propagated round to the axilla. Over aortic area systolic and diastolic murmur heard, harsher and more prolonged than mitral; murmurs conducted up vessels and down sternum. Pulse 80, and regular. Respiratory system normal. At the end of April there was some œdema of the feet on standing. She was treated with digitalis, iron, and arsenic. On 1st May sickness after every meal commenced; on 10th May stirrage was first felt; on 13th May she had epistaxis; on 22nd July she had irregular pains over the abdomen, together with difficulty in micturition; on 24th July she was in bed with a painful swelling and ecchymosis in the upper part of the left thigh, and with severe vomiting. On 25th May there was some hæmatemesis. She was now put upon milk diet, the digitalis mixture stopped, and she was ordered bismuth and opium powders, with ʒss. of brandy every four hours; warm opium fomentations were applied to the thigh. On 28th July the pain and ecchymosis were disappearing. From this time until 15th September, when she was sent to the Maternity Hospital, she had occasional hæmatemesis; extreme prostration and also sleeplessness at night; she vomited three or four times a

day for two or three days at a time, with intervals of a week or two, during which she was better. She at times had some slight hæmoptysis, and often required to sit up in bed in order to breathe at all. Her condition all this time was most critical.

After admission to the Maternity Hospital on 15th September her condition improved considerably; she was kept on milk diet, and treated with bismuth and opium; ℥ss. of brandy was given three times a day. She had no further sickness except once after taking castor-oil. She was rarely troubled with breathlessness except at nights now and again. The opium was gradually diminished in quantity, and the brandy was stopped for a time while she was also allowed a little solid food. Dr Byrom Bramwell examined the condition of her heart, which he found to be only slightly enlarged; the apex beat was displaced outwards (probably by the uterine tumour); over the mitral area was a distinct presystolic murmur, together with a slight systolic murmur which was conducted towards the axilla; over the aortic area were heard systolic and diastolic aortic murmurs, the systolic being very well marked. These were conducted up the vessels and down the sternum.

On 5th October she got up for an hour, and continued to do so on most days after this. On 14th October she complained of pain in her back and left side; also a little sickness. On 15th October pains still continued; considerable dyspnœa during the night. These pains passed off, but recommenced at 11.30 P.M. on 18th October, when the breathing also became extremely troublesome. On 19th October she was much better; the bismuth and opium were stopped, and she was ordered ℥5 of tr. of strophanthus (1 to 20) every four hours. On 23rd October it was determined to try and bring on the labour, as she was already a week past her time, and was becoming extremely nervous lest the new quarter, bringing with it fresh doctors and nurses, should arrive before she was well on the road to recovery. Consequently, at 11.30 A.M. on that day under chloroform I separated the membranes for about 1 inch round the cervix with my finger and gave a hot douche. A large Barnes' bag was then placed in the vagina, and only removed in order to give a hot douche every four hours. No pains resulted from this. On 25th October, at 1 P.M., Dr Croom, with some difficulty without chloroform, passed a large-sized bougie for about 1½ inch between the posterior wall of the uterus and the membranes; a hot douche was then given every four hours. Early on 26th October the pains began, but were feeble and useless at first. During the evening and night of 26th October she had frequent pains, and became extremely hysterical. Chloroform was given during most of the pains. She complained of severe stabbing pain, especially during the labour pains, in the precordial region and passing up into the left arm.

During the pains the pulse became more rapid, and much

weaker and less regular; between the pains it was about 90, full and regular. She continued in this state all night and during the whole of the next day, the os dilating very slowly. She was given ℥5 of tr. of strophanthus every four hours, and ℨss. of brandy every three hours, with beef-tea at frequent intervals.

At 5 P.M. on 27th October 25 minims of tr. of opium were given, but she vomited it at once. She was becoming extremely weak and exhausted, while the difficulty in breathing was so great at times that she had to sit up in bed in order to breathe at all. At 7.40 P.M., when the os was the size of a crown piece, the membranes spontaneously ruptured high up, and a certain amount of liquor amnii escaped. At 9.40 P.M. Dr Croom saw her, and advised that the labour should be ended at once. She was then put deeply under chloroform, and after dilating the os with the fingers I applied forceps, and delivered the child shortly after 10 P.M. The placenta was expressed ten minutes after, and she was then allowed to come out of the chloroform, during the administration of which she had been extremely sick. No ergot was given, as a certain amount of hæmorrhage was thought desirable; there was a good deal of bleeding, which had to be checked later by hot douches. After delivery the pulse was 118, and fairly full; half an hour later it was 96, full, and regular. She was very sick for some time, and complained of sore throat; the precordial pain had entirely gone, and never reappeared. The child was a healthy male, 23 inches long, and weighing 9 lbs. 10 oz., being the largest child born in the Maternity during the quarter. The puerperium was perfectly normal. She was not allowed to nurse her child; there was no trouble with the breasts, as she had very little milk. She was kept on the strophanthus until 29th October, when the dose was reduced to ℥4 every four hours; on 31st October it was further reduced to ℥2. Her breathing was perfectly easy now, and recovery was rapid and uninterrupted. On 7th November she was sent back to Dr Affleck's ward, where the report of her cardiac condition was given as follows: A distinct precordial thrill exists; over the mitral area the first sound is preceded and replaced by a murmur which is conducted into the axilla; the second sound is impure; over the aortic area both sounds are replaced by murmurs which are conducted up the vessels and down the sternum. After a short stay in this ward she was dismissed in fairly good health, but after undertaking the duties of a domestic servant she again broke down; a short rest, however, soon restored her to comparative health, and when I last saw her, about fifteen months ago, she was able to undertake light domestic duties.

(A series of pulse tracings were taken before, during, and after labour, and a few of the more typical of these were shown, in order to give some indication of the condition of her circulation.)

In all the cases which have been recently brought before the Society the cardiac lesion has been only at the mitral orifice; in

this one, however, the main lesion was probably at the aortic orifice, although the mitral valves were at the same time stenosed and incompetent, so that the case forms a fitting and interesting addition to the series. The case is a remarkable one, in that there were numerous and extensive cardiac lesions before the commencement of pregnancy; and it was interesting to mark the increase of existing symptoms and the development of new ones as pregnancy advanced and an extra strain was thrown upon the already overtaxed heart, which, however, rapidly regained its former condition as soon as the labour was completed. When in Dr Affleck's ward she was for a time in a most critical condition, and it seemed almost as if she were bound to die from exhaustion consequent upon the persistent vomiting; yet she recovered from this, and the interesting point is, that not only did premature labour not supervene, but that she even went beyond the ordinary period of pregnancy.

It is generally said that mitral stenosis is the most dangerous heart lesion which can occur as a complication of pregnancy, and that the other lesions are dangerous to a much less degree. The explanations of this are far from satisfactory, and have been fully discussed by Dr Angus Macdonald in his work on *Heart Disease in Pregnancy, etc.*, so that it is unnecessary to refer to them further here. The purpose of this paper is to try and show that the great cause of danger is venous congestion, systemic and pulmonary, and that, since this is produced in the early stages of mitral disease, especially mitral stenosis, therefore this is the most dangerous lesion; but that, since it also appears in the later stages of aortic disease, therefore these become equally dangerous in the later stages, although they are less so when the disease is not so far advanced; in other words, the danger of heart disease as a complication of pregnancy and labour depends more upon the *extent* of the lesion than upon its *nature*.

In order to establish the truth of this proposition it will be necessary shortly to consider,—1, the effects of pregnancy and labour on the normal circulation; 2, the effects of the various heart lesions on the normal circulation; and, 3, how these effects interact on one another.

1. During pregnancy there is increased peripheral resistance, due to the circulation of the blood in the placenta, but this is met normally by a slight hypertrophy of the left ventricle of the heart. During the first stage of labour the pains probably cause an increased strain upon the heart, while its action will be weakened to some extent by the exhaustion which follows from the acute physical suffering. During the second stage of labour, however, the bearing-down pains come into play, and the patient, shutting her mouth, presses with all her abdominal muscles, so that there is considerably increased strain upon the heart and some embarrassment of the pulmonary circulation, while the venous portion of the systemic circulation be-

comes more or less engorged, so that the right side of the heart tends also to become engorged with blood; this must be obvious to any one who gives the question any consideration, and needs no further explanation. During the third stage of labour, as soon as the placenta is separated and expelled, the uterus contracts firmly, and drives the blood suddenly from the uterine sinuses into the abdominal veins, which expand to receive it until the heart can adapt itself to the altered condition of the circulation.

2. We must now shortly consider the main effects of the various heart lesions on the circulation. Mitral stenosis, by preventing the ready passage of the blood from the left auricle into the ventricle, causes engorgement and dilatation of the former; this raises the pressure in the pulmonary veins, and so causes œdema and congestion of the lungs; the backward pressure reacts further on the right side of the heart, and causes dilatation of the auricle and ventricle, so that the systemic veins which open into the right auricle become over-distended and engorged. At the same time the left ventricle receives less than its proper quantity of blood, and in consequence atrophies to some extent. Here, then, the most important results are engorgement and over-distension of the systemic and pulmonary veins, and this condition of affairs coming on very early in the disease, becomes more marked as it progresses.

Mitral regurgitation produces the same sequence of events, due in this case to the blood being forced back on the lungs by the incompetence of the mitral valves; the results, however, do not appear so early in the disease as in the former case, but eventually become equally marked. The left ventricle, however, tends rather to hypertrophy than to atrophy.

Aortic lesions, on the other hand, produce diminished forward rather than increased backward pressure, but sooner or later they come to produce this latter effect also; here, too, the left ventricle hypertrophies.

We see, therefore, that all heart lesions come eventually to cause venous engorgement, but that, while mitral stenosis produces it at once, mitral incompetence does not produce it until the disease has been in existence for a rather longer period, and aortic lesions do not produce it until they have been in existence for a considerable time, and have come to produce increased backward rather than diminished forward pressure, which is their primary effect.

3. We have now to show how it is that pulmonary and systemic venous engorgement produce such dire results in pregnancy and labour. We have seen that pregnancy throws an extra strain upon the heart; if, however, this organ is already weakened by disease, it is unable to withstand this strain, and its action becomes more embarrassed, hence all forms of heart disease are dangerous; but if the disease is not far advanced the heart may, by suitable treatment, be brought to perform the work required of it. In mitral stenosis,

however, we have seen that the left ventricle tends to atrophy, while its muscular fibres also degenerate, and hence this disease is especially dangerous, more especially as it is now a well-recognised fact that in this lesion, owing probably to the above-mentioned degeneration, the heart does not react at all readily to cardiac tonics, such as strophanthus, digitalis, etc. In mitral incompetence and aortic diseases there is already more or less hypertrophy of the left ventricle, according to the extent to which the disease has advanced, and hence the question as to whether the heart can undertake the extra strain thrown upon it by the increased peripheral resistance depends entirely upon the extent to which the disease has advanced.

Abortion is very likely to occur as a result probably of venous engorgement and consequent defective placental circulation, and hence it may occur in any of the heart lesions where this condition of affairs exists.

If labour comes on, during the first stage the heart is very apt to fail owing to the exhaustion of the patient, and its occurrence depends entirely upon the amount of reserve energy left in the organ, *i.e.*, on the extent to which the disease has advanced. The defective action of the heart, moreover, tends to increase the venous engorgement which already exists, and hence pulmonary embarrassment is very much increased.

During the second stage of labour, the bearing-down pains tend naturally to cause the venous engorgement and to embarrass the heart's action. These effects are normally of trifling importance, but when they already exist as a result of heart disease they become a great element of danger, and the heart often fails from engorgement of its right side and inability to drive the blood through the pulmonary circulation. Here, then, the great source of danger is the venous engorgement which is superadded to that normally produced by the bearing-down pains.

When the placenta is born, we have seen that the blood from the uterine sinuses is suddenly thrown into the abdominal veins, which expand, and so prevent the right side of the heart from becoming overdistended. If, however, the abdominal veins are already overdistended, they can no longer expand further, and hence the extra blood is thrown into the right auricle, which becomes still further distended and paralyzed.

We see, therefore, that the great danger in heart disease during pregnancy and labour is due to venous engorgement, and since this engorgement occurs in all heart lesions, therefore the danger is present in them all. We have seen, however, that mitral stenosis, when slight, produces this condition, while mitral incompetence must be more marked, and aortic disease even more so than mitral incompetence before it appears; in other words, while all the various heart lesions produce the condition, its appearance depends on the extent to which each one has advanced, so that we

may say that the danger in heart disease depends rather on the *extent* of the lesion than on its *nature*.

No mention has been made of certain other accidents which may occur during pregnancy in heart disease, viz., the growth of fresh vegetations or the supervention of ulcerative endocarditis, since these may occur equally in all the lesions, and do not concern the point which I wish to bring out to-night; neither have I considered those cases where death occurs later on during the puerperium from pulmonary complications, since these belong to an entirely different category.

A few words may be said as to the treatment of these cases, and in the first place as to the use of cardiac tonics. These should be avoided as long as possible, and never be used until there are evident signs of failure of compensation; before this appears careful diet, moderate exercise, and the use of iron and arsenic are all that are required. As soon as compensation threatens to fail cardiac tonics act well as a rule (except in certain cases of mitral stenosis, where they often have no effect); the best of them is, perhaps, strophanthus in small doses (*e.g.*, ♏ 2½ of the tincture every four hours). It must be remembered, however, that prolonged use of these drugs after compensation has been restored tends to do serious harm, since the hypertrophy of the heart which they produce is followed by degeneration of its muscular fibres. The dose may be increased if necessary, and then gradually diminished again until eventually it may, perhaps, be discontinued altogether for a time. Strophanthus is especially useful where there is continued vomiting due to gastric congestion, and its own tendency to produce sickness may be counteracted by giving it with tr. cardamon. co. If the venous congestion become very marked during pregnancy or labour, bleeding may in some cases give relief, at any rate for a sufficient time to enable the labour to be completed, and so allow the heart to again regain its power. Nitrite of amyl might, perhaps, be of use here just as it was found useful by Dr Fraser Wright during the third stage of labour. Since the bearing-down pains tend to increase the venous engorgement, chloroform should be given as soon as ever they appear, and the second stage of labour should be reduced to the shortest possible time; the administration of chloroform should be continued until after the placenta has been delivered.

When Dr Wright brought under the notice of the Society the case where he used nitrite of amyl in the syncope which followed the delivery of the placenta, some difficulty was found in understanding how it could relieve the engorgement of the heart. The following explanation seems to me, however, to be a reasonable one: the sudden delivery of the placenta causes, as we have seen, an extra amount of blood to be thrown into the right side of the heart, since the abdominal veins are already overdistended; nitrite of amyl dilates the arterioles and lowers the blood-pressure, so that more blood would

tend to pass into the systemic veins, and thus engorge the right side of the heart still further. The veins, however, are already overdistended, so that no more blood can enter them, and hence no harm can be done thus by the drug; but at the same time the nitrite of amyl dilates the *pulmonary* arterioles as well as those of the systemic circulation, and hence the flow of blood through the pulmonary vessels is made easier, and the right side of the heart can empty itself, and gets relief. Hence we see that the important action of the nitrite of amyl in these cases is upon the pulmonary, and not upon the systemic arterioles.

Dr Underhill was much interested in the case so well recorded by Dr Mackness. It was important that all the cases should be observed and recorded, so that eventually we might get a more thorough understanding of the relations between heart disease and pregnancy and labour. The most important lesion in Dr Mackness's case seemed to be the mitral stenosis. He agreed in the main with Dr Mackness in his management of such cases, but he was of opinion that even in cases of this particular lesion the uses of heart tonics, particularly strophanthus, were of the utmost importance, particularly during the course of pregnancy. His experience led most certainly to that conclusion. He thought there was a simpler explanation of the action of nitrite of amyl than that given in the paper. It appeared to him that the dilatation of the arterioles all over the body provided a large space for the reception of the surplus blood which was overdistending the pulmonary vessels.

Professor Simpson was heartily in accord with Dr Underhill as to the value of Dr Mackness's communication. It not only presented a careful record of a very interesting case, but also a useful summary of the various cardiac lesions and their effects on pregnancy and labour. He (Prof. Simpson) thought with Dr Underhill that there was no risk in the more or less continuous use of cardiac tonics, and especially of strophanthus, during the pregnancy. He had never seen anything but good result from their administration continued throughout the gestation. He was glad that in the case recorded by Dr Mackness the result had been so satisfactory, and hoped that Dr Mackness would have further opportunities of observing some of those cases which he had shown so much capacity to analyze and record, so that he might further be able to enrich their Transactions.

Dr Wood said the thanks of the Society were due to Dr Mackness for the able and highly interesting paper which he had brought before it. Dr Wood had a case of mitral stenosis in his own practice about three weeks ago. The patient, aged 28, primipara, had an attack of rheumatic fever twelve years ago, and had suffered from the heart lesion ever since. Cardiac compensation was evidently completely established, and only

broke down on her becoming pregnant. She was treated continuously with digitalis for several months before the birth of her child, larger or smaller doses being given according as it was found necessary, and this continuous administration, he had no hesitation in saying, did her a great deal of good. On his visit to her after labour had begun, he found the first stage pretty well advanced, the breathing very much embarrassed, the pulse irregular and very rapid. During a pain, the embarrassed breathing became greatly exaggerated; the pulse, although the vessel could be felt, could not be counted, there being only an irregular quiver; the face became completely cyanosed from the venous engorgement of vessels. He had her at once placed under chloroform, but very soon changed to ether, and found that the pulse was sustained better. He terminated the labour, which was a breech, as rapidly as possible. In the second stage, the patient's condition was considerably worse than the first,—so much so, that he expected she would succumb from cardiac failure. During the labour, he gave her twice two min. of tinct. strophanth. hypodermically, and one of Natville's granules of digitalin. For several days after her confinement she suffered from œdema of the lungs and pleural cavities, owing, no doubt, to the backward blood-pressure.

Dr Fraser Wright said that Dr Mackness's suggestion as to the action of nitrite of amyl was one which had also occurred to himself at the time of recording his case in July last. The difficulty, however, in accepting this explanation lies in the fact that any dilatation of the pulmonary arterioles will be followed by increased pulmonary venous congestion and increased dyspnœa; yet in the case recorded the dyspnœa was instantly relieved. On the whole, he was still inclined to think that the relief obtained by using this drug is due to dilatation of peripheral systemic arterioles. The fact that bronchitis is often relieved by it offers no explanation, as here the fact that the peripheral bronchioles are also dilated has also manifestly much to do with the result.

Dr Berry Hart thought Dr Owen Mackness's paper a very valuable one, not only from the careful record of the case, but also from his *résumé* on the action of pregnancy on the diseased heart. He hoped Dr Mackness would still continue his observations on a subject he was so well qualified to deal with.

Dr Mackness thanked the Society for their kind reception of his paper. As to the use of cardiac tonics during pregnancy, he pointed out that they tended to produce hypertrophy of the heart, which would be followed by subsequent degeneration of the muscular fibres, and hence they increased the harm done to the heart by pregnancy. It was, therefore, advisable to use them only when absolutely necessary, and to discontinue their use as soon as possible. The failure of cardiac tonics was only observed in certain cases of mitral stenosis, and not in all.

V. NOTES ON A CASE OF HYDROCEPHALUS WITH MENINGOCELE.

By G. Owen C. Mackness, M.D., Broughty Ferry.

Although the condition which was present in the case of which the following are notes is probably not at all rare, yet there were some peculiar features in this particular one which may prove of interest to the Fellows of our Society. I have therefore ventured to bring forward these short notes. To myself the case was not only of great interest, but also most instructive.

I was called one morning a few months ago to a primipara in a neighbouring village, who stated that she had been in labour for about five hours, and that the waters had broken about half an hour before my arrival. On proceeding to examine the patient, I found that there had evidently been a very copious discharge of liquor amnii, since the sheets were completely soaked with it. The abdomen, however, was still very much distended. The pains were strong, and coming about every five minutes. On examining per vaginam my finger came at once upon a tense bag of fluid, which was situated almost immediately inside the vaginal orifice, and became more tense as a pain came on, giving exactly the impression of having to deal with the intact bag of membranes. When the finger was passed further up the vagina and to the side of this bag, the os uteri could be made out to be almost fully dilated, while still further up the bones of the fœtal skull could be felt, loose and movable, as in the case of a putrid fœtus. It was also possible to reach one of the ears.

The first idea was that the membranes had ruptured early and high up, thus allowing the escape of a portion of the liquor amnii, and that the fœtal head had then descended further, so as to plug up the opening, while there still preceded it a bag of membranes, which became more tense with every pain. A more careful examination, however, showed that this could not be the true state of matters, but that the bag was undoubtedly connected closely with the fœtal head, and that the case must therefore be one of meningocele.

The pains continued strong and frequent, and the head rapidly descended in the pelvis, being, however, always preceded by this large tense bag of fluid, which eventually came to be protruded from the vulva as a pear-shaped body, while the head was still some way up the vagina. This bag now exactly resembled the condition of affairs which is occasionally seen when the bag of membranes remains unruptured until the head is almost born. The child was born about half an hour after my arrival, and was dead. The placenta was delivered without difficulty a few minutes after. The mother made a rapid and uninterrupted recovery.

The child was small, but apparently at full term. It had evi-

dently only been dead for a short time, which coincided with the mother's statement that she had felt the fœtal movements up to about a week before the commencement of labour, and that they had then suddenly ceased. The bones of the skull were all loose and easily movable under the scalp, while they were widely separated from one another. The greater part of the occipital bone was evidently absent, and over this region was a tumour of the size of a large orange, and apparently containing fluid. Over the tumour the scalp was very much thinned and almost translucent, while there was no hair covering it. In addition there was a complete cleft palate, but no other malformation. The placenta and membranes were normal in appearance, but there had evidently been the condition of hydramnios. The specimen could, unfortunately, not be obtained, and was buried even before any photograph or drawing could be taken of it. The condition, then, was one of hydrocephalus with meningocele. Besides the exceptionally large size of the tumour, the especial points of interest were, I think, the fact that the child lived almost to full term, and the curious condition presented during labour. Had the meningocele not been present, the labour would have been a very difficult one, owing to the hydrocephalus; but as the head engaged in the pelvis the fluid was pressed into the yielding tumour, and thus the head became even smaller than the normal fœtal skull, and labour was therefore exceptionally easy. The condition presented by the tumour was a very curious one; and as it passed through the partially dilated os uteri it might very easily have been mistaken for the unruptured bag of membranes, and have been treated accordingly. Such a mistake, however, would be prevented by making a more careful examination and pushing the finger up alongside of the side of the tumour, so as to feel the more solid and easily recognisable portions of the fœtal skull.

The mother's condition during the pregnancy had been quite satisfactory, except that she had been slightly incommoded by the condition of hydramnios which coexisted. It was rather a strange coincidence that there had occurred only a few yards off, and a few days before this, a case of spina bifida, with some other curious malformations. This latter case I only saw in consultation; but as I understand that notes of it are to be published shortly by the medical man under whose immediate care it was, I will not do more than thus mention it to-night.

Professor Simpson said it was well to have as full a record of such cases as Dr Mackness had now brought before them as possible, for they were not of frequent occurrence, although from time to time preparations had been shown to the Society. It was interesting to note that in this, as in some other encephalic malformations, such as anencephaly, and as in spina bifida, there was a marked degree of hydramnios.

Dr Mackness thanked the Society for the reception of his paper, and said that in this case there was no reason during pregnancy to account for the occurrence of the deformity.

VI. INTRA-UTERINE RICKETS.

By J. W. Ballantyne, M.D., F.R.C.P.E., Buchanan Scholar, 1883 ; Simpson-Gunning Prizeman, 1889 ; Assistant to the Professor of Midwifery, University of Edinburgh ; Physician for Diseases of Children, Cowgate Dispensary, Edinburgh.

Schwarz has shown (*Jahrb. für Kinderheilk.*, Bd. xxvii., Hft. 4) that slight rachitic changes are far from uncommon in new-born infants whose mothers have been placed under bad hygienic conditions during pregnancy, for out of 500 infants born at the Second Vienna Obstetric Clinic 80·6 per cent. showed the typical rachitic change in the skull, in the ribs, or in both the skull and the ribs. The observations of Kassowitz give results in accordance with the above statement. The example of intra-uterine rickets which I venture to bring before the notice of this Society shows, however, much more advanced and serious rachitic changes than are found in the above-mentioned cases of slight rachitis. In this case the rachitic process has advanced to a stage at which I do not believe it ever arrives in extra-uterine life, and so great is the resulting deformity that the child has an almost monstrous appearance. The characters presented by this infant are also different from those seen in the cases of so-called fœtal rickets or fœtal cretinism.

For permission to dissect the fœtus, which I shall now proceed to describe, I am indebted to Sir William Turner, to whom the specimen was sent. Unfortunately, no note accompanied the specimen, and I have been unable to discover even the name of the sender, therefore no clinical history of the mother or her confinement is available. This is a circumstance much to be regretted, for reasons which are self-evident.

Before making a dissection of the fœtus, I asked Mr Cathie to make two water-colour sketches of the specimen. These drawings represent in a very faithful manner the peculiar and characteristic features which the specimen showed. The limbs are curiously contorted, and nodular swellings mark the position of the shoulder, elbow, wrist, hip, knee, and ankle joints. In the position of the coccyx is a tail-like projection. The fingers and toes are long, and are widely separated from each other. The head appears to be large in comparison with the body, the upper jaw is somewhat prominent, and the occipital region is flattened. There is on the face a peculiar senile look, quite foreign to the expression of the healthy new-born infant. The umbilical cord is seen to be attached to the abdomen, and shows no signs of having been tied. The attitude in which the fœtus lies is characteristic, and is most probably approximately that which it occupied in utero. The head is flexed

upon the sternum, the arms are folded upon the chest, and the legs are flexed and curiously interlocked. The thorax is expanded at its base, and is narrow from side to side anteriorly. These are the appearances shown in the first drawing (Fig. 1); the second (Fig. 2) shows the peculiar deformities of the legs and the curious appearance of the external genitals and perineum. The swollen knee and ankle joints are very evident, as is also the projection in the neighbourhood of the coccyx. A penis is present, but the scrotum is quite collapsed, and does not appear as if it contained testicles. A median raphe stretches from the root of the penis to the anus, and the anal aperture is situated immediately in front of the coccygeal projection.

Such were the outstanding features which this specimen presented to the eye; the following additional characters became evident on closer examination. There was immobility of the limbs at the various joints, and the right thigh was found on palpation to be fractured. So firmly fixed were the joints that an attempt to move the arm at the shoulder resulted in the separation of the shaft of the humerus from the head of the bone. It was also found that the vertebral column was rigidly fixed in a position of flexion. The lower end of the sternum was tilted sharply forwards, and through the skin the extremely contorted form of the scapulæ could be distinctly felt. The total length of the fœtus was 47 ctms. (18½ inches), and the length of the head and trunk from the vertex to the tip of the coccygeal projection was 35·6 ctms. (14 inches). The circumference of the body at the level of the ensiform cartilage was 23 ctms, and at the level of the umbilicus 21·7 ctms.

The head measurements were as follow:—

Diameter occipito-mentalis, . .	= 11·5	ctms.
Diameter occipito-frontalis, . .	= 10·2	„
Diameter suboccipito-bregmatica, .	= 8·9	„
Diameter biparietalis, . . .	= 8·9	„
Diameter bitemporalis, . . .	= 7·7	„

The anterior fontanelle measured 5·1 ctms. in an antero-posterior, and 3·8 ctms. in a transverse direction. These measurements show that the head, far from being hydrocephalic, is rather below the average size as compared with the heads of healthy new-born infants of the same length as this fœtus. The anterior fontanelle is, however, much larger than is normal, and the sutures are wider than they are in healthy infants. The parietal eminences and the occipital protuberance were well marked, and the whole head had, as viewed from above, a somewhat polygonal outline.

The thorax had an antero-posterior diameter of 5·1 ctms. superiorly, of 7·6 ctms. inferiorly, and of 6·4 ctms. at the level of the middle of the sternum. The transverse diameter of the chest at the level of the fifth rib was 5·1 ctms. The swollen condition of the anterior ends of the ribs could be felt through the skin.

The measurements of the limbs were as follow:—

Fig 1

Fig 2

Fig 3

Wm CATHIE DEL ET LITH

Circumference of the arm above the elbow,	= 6·0	ctms.
Circumference of the arm at the elbow, .	= 8·7	„
Circumference of the arm below the elbow,	= 6·0	„
Circumference of the leg below the knee,	= 5·1	„
Circumference of the leg at the knee, .	= 11·0	„

The circumference of the leg at the knee was, therefore, more than twice that below the knee; and in the case of the arm the circumference at the elbow was half as great again as the measurement below or above that joint. These figures demonstrate very clearly the enormously swollen condition of the joints of the limbs.

The abdomen of the fœtus was opened, and there was found in the peritoneal cavity a small quantity of serous fluid; but there was no glueing together of the intestines or other sign of inflammation. The testicles, which had not descended into the scrotum, were found lying, one on each side, in front of the psoas muscle a little above the plane of the pelvic brim. The liver, spleen, and kidneys had a normal appearance, and the stomach was empty and collapsed. In the thorax the lungs were found in an unexpanded condition lying posteriorly to the heart, and in the latter organ the foramen ovale was patent, as was also the ductus arteriosus. It may, therefore, be concluded that respiration was never established. Subcutaneous adipose tissue was found all over the body, but it was present in smaller amount than in a healthy full-time infant. The absence of the testicles from the scrotum served to explain the peculiar appearance of the perineal region.

I shall now describe with some fulness the appearances presented by the bones in this fœtus, for it was in the skeleton that the most remarkable characters were visible.

The Cranium.—Whilst all the fontanelles of the head, as well as the coronal, sagittal, frontal, and lambdoidal sutures were wider than normal, yet the ossification of the cranial bones was irregular rather than defective; and indeed the bones of the base of the cranium and of the face showed a more advanced stage of ossification than they do in the healthy infant at birth. The parietal bosses were large and prominent, but the margins of the parietal bones were thin, flexible, and comb-like. The occipital bone was curiously deformed. It had the shape of a hook, the occipitals being bent at a sharp angle upon the supra-occiput, and the basi-occiput being acutely flexed upon the exoccipital portions of the bone. The margins of the supra-occiput were thin and flexible, and this part of the bone was flat, a fact which explained the flattened appearance of the back of the head already described. There was no trace of cartilage between the supra-occiput and the exoccipitals, and the ossification of the basi- and ex-occipitals was far advanced. Whilst the ossification of the supra-occiput was therefore somewhat defective, the ossific process was far advanced

in the basi- and ex-occipital parts of the bones,—the parts, it will be remembered, which pass through a pre-cartilaginous stage before becoming bone. The frontal bone in the neighbourhood of its two eminences was ossified, but the two halves of the bone were separated by an inter-frontal suture, much wider than normal. The orbital plates of the frontal bone were thin and fragile. All the parts of the sphenoid were joined by osseous union, there being no cartilage between the basi- and pre-sphenoid portions of the bone. The rostrum of the sphenoid was of unusually large size, being nearly 2 ctms. in length, and was articulated in the usual way with the vomer. The temporal bones, with the exception of the squamous portions, were well ossified, and the tympanic ossicles and annulus tympanicus were as well developed as they are in the new-born healthy infant. The ethmoid bone was normal in appearance. It was found that the two halves of the lower maxilla were well ossified, the condyles being even a little larger than they normally are at birth. The lower jaw contained the usual number of dental germs, and this fact is specially worthy of note, for it is well known from clinical observation that when rickets comes on during infancy there is marked retardation in the eruption of the teeth, and great irregularity in the mode of their appearance. The superior maxillæ, which also contained the usual dental germs, projected forwards in the middle line, and this projection I believe to have been caused by the unusually large size of the rostrum of the sphenoid. This peculiarity of the sphenoidal rostrum may serve to explain the beak shape of the upper jaw described by Fleischman as common in post-natal rachitis. The malars and the other facial bones were well developed and fully ossified.

The Vertebral Column and Pelvis.—The spine, in this case, was curved, and fixedly curved both laterally and antero-posteriorly. There was a convexity to the left side in the cervical and upper dorsal regions, a convexity to the right in the middle dorsal. The lower dorsal portion of the spine was straight, and there was a convexity to the left in the lumbar region. There was also a general anterior concavity of the whole spine. Such fixed curvatures of the spine are entirely absent in the healthy new-born infant. The sacrum had a marked promontory and was well ossified. The coccyx was entirely cartilaginous, and was of enormous size, a fact which fully accounted for the tail-like projection. It consisted of the usual number of segments (four). The pelvic brim was contracted in its antero-posterior diameter, for the transverse diameter at the brim exceeded the antero-posterior by 5 mms. The iliac fossæ were slightly deeper than in the normal fœtus, and the crests of the ilia and the anterior iliac spines were thick and rounded. The ossification of the iliac bones was not so far advanced as it usually is at birth, whilst that of the ischial and pubic bones was much retarded. The pelvis, therefore, presented characters quite different from those seen in the normal fœtal pelvis in which the antero-

posterior diameter at the brim is equal to or greater than the transverse, and in which the iliac fossæ are very shallow. The pelvis, also, does not show all the characteristic features of a typical adult rachitic pelvis, although in some of its characters the resemblance is strong. The anterior wall of the pelvis has an appearance as if it had been compressed and driven backwards by the enormously large upper extremities of the femora.

The Clavicles and Scapulæ.—The clavicles were relatively long when compared with the rest of the bones. Their inner ends were enlarged, and the upper surface of the bones showed a marked concavity. The right clavicle was slightly longer than the left. It measured 3 ctms.; the left measured 2·8 ctms. The chin of the fœtus appeared to rest upon the upper concave surfaces of the clavicles. Both scapulæ were remarkably contorted. The infra- and supra-spinous fossæ were very deep, and the normal sub-scapular fossa was replaced by a convexity, upon which, however, was a small concavity corresponding in position to the region of the spine on the external aspect of the bones. The vertebral border of each scapula had a marked S-shape, and the lower angle was twisted forwards. The spine of the scapula had a distinct projection directed downwards about midway between its two extremities. The glenoid cavity was not well ossified.

The Sternum and the Ribs.—The manubrium sterni was very large, and the first three portions of the meso-sternum were well ossified. The ensiform cartilage was large, and its tip was turned forwards. There was a well-marked concavity on the anterior aspect of the sternum, with a corresponding convexity on its posterior surface. It may here be remarked that the heart showed a distinct furrow on its anterior aspect, marking the sharp bend which the sternum showed. A similar condition of the heart was observed by Bland Sutton in cases of rickets in monkeys (Introduction to *General Pathology*, p. 56), and the same author pointed out that marked thinning of the right ventricular wall resulted from the pressure to which it was subjected by the sharply-flexed sternum. In this case the thinning was not well marked, although the depression upon the anterior aspect of the heart was very evident. The ribs, which were rather slender at their vertebral ends, had distinct swellings at their sternal ends. The swelling on the anterior end of a rib was hollowed out into a little circular cavity from which a thin costal cartilage passed to the sternum. In the first three ribs the angle was very sharp, the 4th, 5th, and 6th ribs had no marked angle, whilst the lower ribs had an angle not nearly so well defined as those of the upper three ribs. These characters of the ribs were seen to correspond to the convexity and concavity of the scapula. The lower margins of the middle ribs were very thin, and were distinctly notched. The anterior ends of the two upper ribs on each side were directed upwards. In the

case of the other ribs they were directed downwards. The intercostal spaces were practically non-existent.

The Long Bones of the Limbs.—The long bones had this peculiarity in common, that whilst their ends were enormously large, the intervening shaft was small, short, straight, and nearly quite cylindrical. In the case of the femur there was a trace of the linea aspera, but in the case of the other long bones the shafts were quite smooth. The ends of the long bones were composed principally of cartilage greatly hypertrophied, and of softer consistence than is normal in the new-born infant; but at the line where the cartilage stopped and the bone began there was also a great thickening of the bone, so that the large ends of the bones were partly osseous, although principally cartilaginous. There was immobility of the joints and a certain amount of dislocation, especially in the case of the hip, shoulder, and ankle, and both the immobility and dislocation were apparently due to the enormous size of the opposing cartilaginous surfaces. Some of the characters of the individual long bones may be given here. The shaft of the humerus was straight, cylindrical, and short. The two extremities were greatly enlarged. The upper was somewhat round in form; the lower was broader transversely than antero-posteriorly. There were no ossific centres in the epiphyses. Taking the length of the humerus in the normal infant as 6 ctms., it was seen that in this case the bone was shorter than normal. The left humerus measured 4 ctms. in length, the right 3·9 ctms. The upper end of each humerus had a circumference of 7 ctms., whilst the circumference of the shaft was only 2·1 ctms. The radius and ulna were of equal length, each measuring 3·2 ctms., but the radius extended beyond the ulna below, and the ulna passed beyond the radius at the elbow-joint above. The interosseous space was 6 mm. in width. The lower end of the ulna had a marked concavity inwards. The lower end of the radius had a circumference of 3·4 ctms.; the upper end had one of 2·6 ctms., whilst the shaft measured only 1·3 ctms. in circumference. The upper end of the ulna had a circumference of 3·6 ctms., the lower end one of 3·3 ctms., whilst the shaft had one of only 1·4 ctms.

The femur on both sides had a slight concavity inwards of its shaft. There was a distinct projection on the inner surface of the upper end corresponding in position to the trochanter minor, but the trochanter major was lost in the general cartilaginous mass. The head of the femur was no larger than a pea, but was ossified. The femur measured 4·5 ctms. in length, the circumference at the upper end was 7·2 ctms., at the lower end 8·0 ctms., and at the middle of the shaft 2·1 ctms. The tibia was 3·3 ctms. in length, and its shaft had a circumference of 2·1 ctms. The shaft was thicker than that of the fibula, which measured only 1 ctm. in circumference. The tibia was displaced forwards on to the dorsum of the foot. The fibula was situated in a plane posterior to that of the

tibia, and more markedly so than in the case of the normal infant. It had a curvature convex to the front and internally, and concave posteriorly and externally. There was a large elliptical inter-osseous space 9 mms. in breadth. The length of the fibula was 3·1 ctms., and it reached to a level a little below that of the tibia. The patella was large and cartilaginous.

The Hand and Foot.—There was no point of ossification in the carpus, but the shafts of the metacarpal bones were large and well ossified, as were also the first and second but not the terminal phalanges of the digits. The bones of the tarsus were cartilaginous, except the os calcis, which had a large ossific centre. The feet were distinctly clubbed (talipes varus). All the metatarsal bones were ossified. The first and second phalanges of all the toes were ossified; the terminal phalanges were cartilaginous. The hallux, like the pollex, had both its phalanges osseous.

Such were the characters of the component parts of the skeleton, and it may be stated in addition that at the time when the fœtus came into Sir William Turner's possession there was a transverse fracture of the right femur in the upper third of its shaft. This fracture may have been intra-uterine; but I am more inclined to believe that it was produced at the time of birth or subsequently, for the long bones were very fragile, and during the process of dissection I myself accidentally fractured the other femur and the right humerus. In the case of the last-mentioned bones, however, what really occurred was a separation of the diaphysis from the epiphysis along the line where cartilage and bone met; whilst in the case of the right femur there was a true fracture of the bone itself. Each of the long bones presented on section very similar characters. The medullary canal was large and was surrounded by friable spongy osseous tissue. Near the epiphyses there was a thick layer of hard bone, and the epiphysial extremities of the bone were composed of soft cartilage of an almost gelatinous consistence. The microscopic examination of the tissues and organs of this fœtus was not satisfactory, the specimen not being fresh when I made the dissection, but the swollen ends of the long bones and the whole of the coccyx seemed to be made up of large masses of cartilage cells with little or no intercellular matrix and no deposit of lime salts. The absence of the placenta and membranes of this fœtus is a circumstance much to be regretted, as is also the want of any clinical history of the case. The incompleteness of the case is a great misfortune, nevertheless there are several interesting questions suggested by this specimen, to some of which I may now briefly advert.

Spiegelberg (*Lehrb. der Geburt*, 1875, p. 356) and other writers recognise two varieties of intra-uterine rachitis—*fœtal* rickets and *congenital* rickets. Winkler (*Arch. f. Gyn.*, Bd. ii. p. 101) describes two varieties also, but gives to them the names of *micromelic* rickets and *annular* rickets.

Fœtal Rickets.—The class of cases to which the name of fœtal rachitis is given includes the cases of so-called micromelic rickets, and is also allied, in a way which is at present somewhat obscure, with the conditions known as fœtal cretinism and achondroplasy (Parrot). Fœtal rickets is a disease which it is supposed comes on during the earlier months of intra-uterine life, and in which it is believed the rachitic process is fully evolved *in utero*, with the result that at birth the infant is really a cured rachitic. The stage in which the bones are soft is, it is stated, past, and at the time of birth the bones are found hard and eburnated, and the peculiar deformities fixed. An infant with fœtal rickets presents the following characters so constant as to lead Tarnier and Budin (*Traité de l'art des accouchements*, ii. p. 356) to make the statement that all the fœtuses seem to have been stereotyped from the same model (*v.* Fig. 3). The head is large and is often hydrocephalic, but hydrocephalus is not an invariable concomitant condition, neither is the large size of the head always due to the presence of fluid in the ventricles (Depaul, *Arch. de Tocologie*, 1877, pp. 641–50). The thorax has the form of a cone with a wide base, the tip of the ensiform cartilage projects forwards, and the margins of the false ribs are turned outwards. The large size of the abdomen is characteristic, and there may or may not be a concomitant ascites. The small, stunted appearance of the limbs contrasts very markedly with that of the large head and prominent abdomen. Adipose tissue under the skin is very plentiful all over the body, and in the case of the extremities the large quantity of the subcutaneous fat and the lax condition of the skin have thrown the integument into transverse folds, which mask, to a great extent, the normal flexures of the articulations. The fœtus looks as if it had on garments too large for it. The shafts of the long bones are composed of hard, compact osseous tissue, are thick, very short, and are bent in abnormal directions. The extremities of the bones are somewhat swollen. There is no actively proliferating zone of cartilage at the junction area between shaft and epiphysis in the case of the long bones, and it is on account of this fact that Parrot has proposed to give to the disease the name of achondroplasy. Fœtal rickets does not, as a rule, show fractures of the bones. The deformity of the pelvis varies much in amount, it may even be absent entirely, but usually there is some flattening from before backwards. The term micromelic rachitis was suggested by the fact that the limbs are so small. Some authors, however, as Lauro (*Archivio di Patol. Inf.*, 1887), believe that whilst most of the cases described as micromelic rachitis are really cases of true rickets, some of them are due to processes quite distinct from rachitis,—to the interposition, namely, of periosteum between the epiphysial cartilages and the diaphysis, or to defective cartilage formation. In this relation it must necessarily be remembered that deformities in the skeleton

of the fœtus may be due to conditions other than the rachitic. Barlow (Keating's *Cyclopædia of the Diseases of Children*, vol. ii. p. 253) is of opinion that the cases of fœtal rickets which have been described are more properly to be regarded as examples of fœtal cretinism. He further notes that in a case described by himself there was the curious tribasilar synostosis first described in Virchow's *Pathological Archives*, vol. c. p. 256. This condition consists in the premature union of the basi-occipital, basi-sphenoid, and præ-sphenoid, with the result that there is formed at the base of the cranium one short continuous bone—the os tribasilare. This peculiar state of premature osseous union of the bones of the base of the cranium is not in itself sufficient evidence to show that the cases of fœtal rickets are not true rachitis, for in the case which I have just described, and which, as I shall now show, seems to form a connecting link between fœtal rickets and congenital rickets, there is also this early union of the præ-sphenoid, basi-sphenoid, and basi-occipital. The condition, also, of the thyroid cannot be adduced as evidence for the statement that fœtal rickets is really fœtal cretinism, for the reason that in these cases the thyroid is often quite normal. Infants affected with fœtal rickets are usually still-born. Infants with fœtal rickets present a very considerable superficial resemblance to those rare monstrosities known as phocomely, in which the segments of the limbs are very small and entirely cartilaginous.

It will be seen at once that the specimen which I have described to-night presents features which are, with only one or two exceptions, quite different from the characters seen in cases of fœtal rickets. The general appearance of the limbs is quite different, and the changes in the separate bones are also quite distinct in this case as compared with the conditions found in the fœtal rachitic fœtuses. There is, however, one feature in common, namely, the prematurely ossified condition of the bones of the base of the cranium. In the case I have described the præ- and basi-sphenoid are firmly joined by osseous union, whilst the basi-sphenoid and the basi-occiput, although not firmly united by bone, yet show no intervening plate of cartilage such as is present in the healthy infant at birth. There is, therefore, a marked resemblance between the condition of the bones at the base of the cranium in this specimen and the premature tribasilar synostosis described by Virchow, Barlow, and others in cases of fœtal rachitis or fœtal cretinism. In this one character, therefore, there is a resemblance between this case and the described cases of fœtal rachitis; but in its other features the case resembles the second variety of intra-uterine rickets—the congenital form, or, to use Winkler's nomenclature, the annular variety.

Congenital Rachitis.—Under this designation Spiegelberg (*loc. cit.*) and Quisling (*Arch. f. Gyn.*, Bd. ix., Hft. 4 and 5) include those cases in which rachitic symptoms are present in the new-

born infant either in an incipient form or else in a stage of full evolution. Many examples of the incipient form of congenital rickets are to be met with in practice, more especially on the Continent of Europe, as has been clearly demonstrated by the observations of Schwarz at Vienna, and of others at Christiania and Paris. In the incipient form the most common manifestations are the head changes known as craniotabes, consisting in enlarged fontanelles and soft and easily impressible cranial bones, and along with the skull changes there are usually associated the changes in the bones of the thorax known as breast rachitis or the rachitic rosary. In 37·6 per cent. of the new-born infants at the Second Vienna Obstetric Clinic Schwarz found the skull and breast changes in a more or less marked degree, whilst in 31 per cent. the ribs alone were diseased, and in 7·2 per cent. there existed only the cranial rachitic changes. It is much more uncommon to find in this incipient form of congenital rachitis the characteristic rickety changes in the limbs. I have met with a few cases of slight rickets in infants in dispensary practice in Edinburgh, and those whose experience has been larger than mine must have met with many such cases. Congenital rachitis in full process of evolution presents, in addition to the changes in the thorax and the craniotabes, marked enlargement of the ends of the long bones, a more deformed condition of the pelvis, and the presence of a varying number of fractures of the bones or of separations of epiphysis from diaphysis. In these cases the resulting deformity is much greater than in incipient rickets, or even in fœtal rachitis. The rachitic process is in, or has only just passed through the soft stage, and therefore there is seen in such cases great deformity of all the bones of the skeleton, with the exception of those whose ossification begins very early in intra-uterine life, such as the clavicles, the maxillæ (inferior and superior), the malars, and the greater number of the vertebræ. This form of rickets has been called by Winkler annular, on account of the presence of furrows on the long bones. These furrows have been supposed to represent the sites of intra-uterine fractures which have united whilst the fœtus was still in utero; but this explanation of the ridges and furrows on the bones has not been accepted by Charpentier and others, who look upon them as having been produced by defects in the process of calcification. An infant affected with congenital rachitis may live, and the rachitic process may be continued in extra-uterine life, but in the cases where the osseous lesions are very marked a separate existence comes to be impossible.

The specimen which has formed the subject of this communication is an example of far-advanced and well-marked congenital rachitis. It is a rare occurrence to find in a new-born infant such marked rachitic changes; and it is probable, as Barlow suggests, that intra-uterine rickets runs an accelerated course as compared with post-natal rachitis. The changes at the ends of the long bones

are very extensive, and the deformity of the chest walls, of the sternum, scapulæ, pelvis, coccyx, and base of the cranium, is greater than that usually described. The peculiar changes at the base of the cranium lead me to the conclusion that in this case there was in early fœtal life true fœtal rachitis, which, as it were, became cured and passed into the stage of hard, compact bone production; and that then the rachitic process attacked the long bones and the other parts of the skeleton, and had in them reached the stage of excessive soft cartilage formation when the infant was born. I look upon the case, therefore, as one forming a connecting link between the fœtal and congenital forms of intra-uterine rickets. Spiegelberg, Lauro, and others, have shown that the histological characters of intra- and extra-uterine rickets are identical, and this case would seem to support the statement by showing the possibility of the existence in the same fœtus of characters peculiar to both fœtal and congenital rachitis. The deformities in this infant seem to owe their character very much to the attitude of the fœtus in utero, and this is especially the case with the sternum, ribs, scapulæ, and pelvis. Whether the fracture of the right femur took place in utero at birth or after birth it is impossible, from the absence of any clinical history, to say, but the peculiar form of the occiput seems to have been due to intra-uterine fractures which have partially united. The numerous dislocations present in this case are no doubt due to the enormously large size of the opposed articular surfaces.

There are three leading theories as to the pathogenesis of rickets, —firstly, that advanced by Kassowitz, who regards rickets as due to a chronic inflammation beginning in the bone-forming tissues; secondly, that theory which regards deficiency in the supply of the mineral constituents as the cause; and, thirdly, the acid theory, which states that the normally calcified bones are deprived of their lime by some acid, as lactic, present in the circulation. It is not, however, within the scope of this paper to enter into the vexed question of etiology, and the same remark holds with regard to the subject of treatment, which must necessarily be maternal.

The description of the changes in the skeleton in this case formed part of the appendix to the M.D. thesis on "Some Anatomical and Pathological Conditions of the Fœtus and New-born Infant in their Relation to Obstetrics," handed in by me to the Edinburgh University last April.

The President remarked on the value of the paper.

Meeting III.—January 8, 1890.

Dr Berry Hart, *President, in the Chair.*

I. *Dr John Thomson* exhibited a patient with almost entire CONGENITAL ABSENCE OF THE RADIUS ON BOTH SIDES. The girl was 16 years of age, healthy, and, with the exception of the forearms and hands, well formed. The condition of the forearms and hands was exactly the same on the two sides. The ulna was only $6\frac{1}{2}$ inches in length, much curved, and thickened so that its lower end was $1\frac{1}{3}$ inches in diameter. The radius was represented by a wedge-shaped fragment of bone, not an inch in length, which was closely attached to the upper aspect of the carpus. The hand was small, and without a trace of a thumb; it was articulated, or rather attached by fibrous tissue to the side of the ulna at a right angle, and moved round it. The chief point of interest in connexion with the hand was the condition of the little finger, which was slightly larger, comparatively, than the other digits, and when at rest stood somewhat apart from the ring finger. The patient had acquired a considerable power of opposing the little to the ring finger, so that, in some sort, it took the place of a thumb, and she was thereby enabled to do a considerable amount of work with her apparently helpless hands. She could lift considerable weights, could button and unbutton her dress, could sew slowly, and could write wonderfully well. In sewing, the needle was grasped by the index and middle fingers, and pushed through the cloth by the distal joint of the ring finger. In writing, the shaft of the pen was held between the index and middle fingers, and the point was guided by the tip of the little finger resting upon it. The patient's relatives had all, as far as was known, been well formed in every respect. Dr Thomson thought the case might interest the Society, not only because it was an example of a somewhat uncommon malformation, but especially as the amount of use which the girl made of the deformed limbs helped to throw light on the prognosis with regard to the possibility of future usefulness which one might give in such cases.

II. *Dr J. W. Ballantyne* exhibited—(*a.*) A specimen showing PERITONITIS IN THE NEW-BORN INFANT. The child was born in the Royal Maternity on the 4th of November last. The mother, M. W., was 19 years of age, and a primipara; labour lasted for over twenty-seven hours, and was terminated with some difficulty by means of forceps; there was no tear of the perineum, but there was a small vaginal tear which bled freely. The vertex presented, and the head lay in the O.L.A. position. The child, a fully-developed female infant, weighed 8 lbs. 4 oz., and measured 23 inches in length; the head diameters were as follow:—O.M., $5\frac{1}{2}$ inches; O.F., 5 inches; S.O.B., $3\frac{3}{4}$ inches; Bi-P., $3\frac{3}{4}$ inches;

and Bi-T., 3¼ inches; whilst the circumferences were—O.M., 17 inches; O.F., 16 inches; and S.O.B., 13 inches. The placenta weighed 1 lb. 10 oz., and the umbilical cord was 23 inches in length. The mother had a normal puerperium; but the child died without being manifestly ill some thirty-two hours after birth. The abdomen was considerably distended, and gave a tympanitic note. With the permission of Prof. Simpson, I made frozen sections of the infant, as I wished to ascertain the relations of some of the abdominal and pelvic viscera; but on opening into the abdomen, I found that there was a distinctly pathological condition. The intestines, both large and small, were distended with fetid gas, fluid meconium, and milk curd; and, further, the intestinal coils were glued to each other, to the under surface of the liver, and to the pelvic viscera. On separating the apposed intestines, the peritoneal aspect of the bowel had a markedly granular appearance, but there was no fluid in either the abdominal or pelvic peritoneal sacs. There was, therefore, a recent dry peritonitis in the abdomen. In the pelvis there were signs of older peritonitis, for the right Fallopian tube and broad ligament were firmly adherent to the peritoneal aspect of the cæcum. The right Fallopian tube ran from the fundus uteri at first outwards for a very short distance, and then turned upwards and slightly backwards, it then made a sharp bend and passed downwards and slightly backwards, and then finally it passed outwards and slightly backwards to its fimbriated end. The ovary, which was slightly twisted on its long axis, lay posterior to the tube, and was directed outwards, upwards, and slightly backwards. Both the ovary and tube lay above the pelvic brim at the level of the fifth lumbar vertebra.

(*b.*) A specimen showing an ANTE-MORTEM CLOT IN THE HEART OF AN INFANT. The infant was born in the Maternity Hospital on 12th January 1889. The mother was a primipara of 22 years of age. The child presented by the vertex in the O.L.A. position, and the labour was normal. The child, a small female, weighed 6 lb. 12 oz., and measured 19½ inches in length. The placenta weighed 1 lb. 9 oz., and the cord measured 18 inches in length. Both placenta and cord were normal, and the mother made an uninterrupted recovery. The measurements of the infant's head were as follow:—O.M., 4¾ inches; O.F., 4 inches; S.O.B., 3¼ inches; Bi-P., 3⅛ inches; Bi-T., 2¾ inches; and the circumferences were, O.M., 14 inches; O.F., 12½ inches; and S.O.B., 11½ inches. The infant seemed perfectly healthy, and lived till the fifth day, when it was noticed that its lips were blue and its pulse very weak; and in less than an hour the face became black, the pulse almost imperceptible, and the breathing rapid and shallow. In a few minutes the child was dead. On opening the thorax and heart, it was found that the right auricle was nearly filled with a whitish-yellow clot and a quantity of pale yellow serum. Pro-

longations from this clot extended for a short distance into the superior and inferior venæ cavæ, and in the left ventricle was a more recent red clot extending into the aorta. Microscopic examination of the right auricular wall showed slight myocarditic and well-marked endocarditic changes, whilst the blood clot was seen to be made up of a dense network of fibrin with red and white blood corpuscles lying in the meshes. The clot was noted to be firmly continuous with the endocardium. Between the endo- and myocardium were seen greatly dilated capillaries. The tricuspid valve was firmer and thicker than normal; but the other cardiac valves showed no morbid appearances. The foramen ovale was filled up, but not yet closed in by the membrane.

III. GYNÆCOLOGICAL CASES TREATED BY ELECTRICITY IN PROFESSOR SIMPSON'S CLINIQUE.

By W. Fraser Wright, M.B., formerly Buchanan Scholar, University of Edinburgh, and late Clinical Assistant, University Gynæcological Wards, Edinburgh Infirmary.

The subject of my communication to this Society to-night is one about which so much has been ably written, and by men of authority, that I have naturally much hesitation in bringing it before an audience so able to criticise and discuss it. But I am fortified by the idea that facts, and *facts only*, will be laid before you, with such slight and imperfect interpretation as my necessarily limited experience enables me to put upon them. For although there have been endless papers and discussions upon *the* question which above all others engrosses—and will likely for some time—the attention of the whole gynæcological world, yet it seems to me that much of the literature on this subject is of comparatively little value. For it is the fact that communications dealing with details of cases treated by electricity form an insignificant minority when compared with those recording impressions of its utility as a therapeutic agent; and *mere records of impressions and opinions, however correct and exact they may be, are of practically little value compared with the data from which these impressions have been received.*

So important does it seem to me—and I hope I do not exaggerate this importance—to have the cases themselves presented as well as the results, so that we may see which are, and which are not, benefited by the electrical treatment, that I venture to-night to lay before you, as clearly and shortly as possible, the few observations I have been able to make on the subject. The number of cases is not great, but much time and care have been bestowed upon them, so that the results may be taken as reliable: all diagnoses having been confirmed by men whose capacity in this respect cannot be questioned.

The cases treated were those which came to the Buchanan Ward of the Royal Infirmary while I was Prof. Simpson's hospital assistant, and had charge of his beds during the year 1887–1888, to whose kindness and supervision I am greatly indebted. Several other cases were treated during this time; but as these, for various reasons, got only one or two applications, it is obviously of no use including them in this series.

My purpose then is to relate, as shortly as possible, the symptomatic and physical condition of each patient on admission, the treatment employed, with the result, and the patient's condition a year afterwards—this latter point being of great importance. This takes up much time and space, but I must rely on your kind indulgence, feeling that such a recital is the only way to make the observations of any practical use to the Fellows of the Society. The paper is purely clinical, and I must carefully keep clear of all speculation and theoretical discussion as to the rationale of the treatment, fascinating as such a subject is.

To facilitate discussion, and to enable the Fellows to follow me with more interest than would be the case if a bald recital of case after case were given, I have divided the material into four groups, according to the symptoms presented, for these are after all what render treatment necessary.

In this connexion it is interesting to note that in a book recently published by Dr Thomas Keith and his son, dealing with 106 cases of fibroid tumours of the uterus—or at least suspected fibroids, for some turned out apparently to be malignant—in only eight cases did the patient come complaining of the presence of a tumour or swelling; in all the others the complaint was of some symptom to which the tumour gave rise.

This work being undertaken at a time when there was much discussion as to the efficacy of electricity as a means of treatment in gynæcology, my object was to find out, as far as possible, whether the treatment did good or not, whether it could arrest hæmorrhage, relieve the symptoms, and diminish the size of fibroids, as some maintained; or whether it was of no use at all, as others held. But, as is usual with new methods of treatment, I have found that it is not so useful as some would have us infer, or so useless as others suppose; but that between these two extremes the real truth apparently lies. For without a doubt, in my hands at any rate, the treatment has been very successful,—and successful, moreover, in a class of cases in which no other treatment,except hysterectomy or removal of the appendages, would have possibly done good. Whether one is justified in removing appendages, or the uterus itself, without first of all giving the patient the chance of being relieved, and possibly cured, by this new treatment, is a question I must leave for the consideration of those whose operative experience enables them to speak with some authority. I am not qualified to discuss the point.

This, indeed, has been a very vexed question ever since Apostoli introduced his new method. To me it seemed premature to discuss it, as no one really knew how much or how little electricity could accomplish. Even now it is only on trial, and all criticism should be withheld till a sufficient number of data can be accumulated, upon which to form a permanent valuation; and this must yet take some time.

I would, however, venture to urge the important necessity of those engaged in this work publishing details, and *details of all cases*—successful or not—so that all may have an opportunity of forming an opinion as to the cause of failure. It is only in this way that any real progress will be made.

Having made these preliminary remarks, I will now proceed to relate the cases, which for convenience may be divided into the following four categories:—

1. Bleeding fibroids.
2. Fibroids causing pressure symptoms, especially in connexion with the bladder functions.
3. Fibroids in which the tumour caused pain and dysmenorrhœa (a scanty flow often being associated).
4. A miscellaneous group, in which inflammatory exudations are the most important.

During the course of electrical treatment to which these cases were subjected, ergot and all other drugs and treatment were withheld; so that, except when otherwise stated, there is only the one probable cause for the result.

Details of the Cases.

A.—Fibroids, with Hæmorrhage as the chief symptom.

Case I.—Mrs C., æt. 27, married five years, sterile. Was admitted to Ward XXIV. first on 22nd August 1887, complaining of great difficulty in making water, pain in abdomen, and increased monthly loss.

Up till four years ago her periods lasted four or five days, but then she noticed that they gradually were becoming longer and the discharge much more profuse, so that for some time the duration had been eight to twelve days. A year and a half after this, she began to experience great difficulty in passing water, especially at the periods, when it had to be drawn off almost constantly with a catheter. There had been also great dysmenorrhœa during this time, and continual pain in abdomen between "times."

A fibroid was found on the posterior wall of the retroverted uterus, blocking up the pelvis, and quite fixed. It was very painful to the touch.

She was treated by rest in bed, ergot, etc., and attempts were made to lift the mass out of the pelvis by bags, filled with air and water,

placed sometimes in the rectum and sometimes in the vagina, and also manually under chloroform; but all to no purpose. She went away after six weeks without being at all improved, and returned on 20th December to undergo similar treatment, but again without any good result.

She was admitted a third time on 18th April 1888, by which time we had a battery. Her condition was, if anything, worse than before, the catheter being constantly required, there being great abdominal pain and menorrhagia. The patient was quite unable to walk owing to the pain it caused, and was consequently totally unfit for her housework.

The vaginal canal was found to be encroached upon by a mass of firm, hard tissue, which, bulging through the posterior fornix, filled the pelvis, and was immovable. It was very sensitive. The cervix uteri lay high up behind the symphysis, and was directed upwards and forwards, so that it could barely be touched with the tip of the finger between the symphysis pubis and the tumour mass. *Bimanually*, it was impossible to make out the uterus as distinct from the tumour mass. The whole thing was about the size of a fœtal head, and quite fixed. Evidently, then, the case was one of a fibroid growing from the posterior wall of the retroverted uterus. It was quite impossible to get a sound into the cervical canal.

The tumour was punctured with the steel trocar, which was made negative. Fourteen applications were made, the first on April 19th, and the last on October 2nd, 1888. The intensity varied from 50 to 150 mà. (milliampères), and the duration from five to ten minutes, more frequently ten minutes. The mass was punctured through its most prominent part in the posterior fornix, about 1½ inches behind the cervix, and the previous puncture was allowed always to be nearly healed before a fresh one was made. This generally took a little over a week, but for various reasons it was not convenient to make the applications so often. Still punctures can be made with safety every week; if oftener, there is risk.

During this treatment she improved greatly, passing through five periods, whose average duration was seven days, the amount being greatly lessened. This is a point of some interest, showing, as it does, that hæmorrhage may be arrested by a process other than positive intra-uterine cauterization. The micturition became much less difficult, so that the catheter was required only nine times during these six months; whereas, just previous to admission, it was necessary every time she required to pass water. There was also great diminution in the pain, so that the patient was able to walk quite comfortably, attending as an out-patient during the latter half of the treatment. There was a distinct diminution in the size of the tumour mass, so that it no longer blocked the pelvis, but was quite distinctly movable, and without causing pain when grasped bimanually.

Further History.—On 9th October 1889, *i.e.*, twelve months after cessation of treatment, the patient was looking better than ever, able to do her housework, and felt in better health than she had been for years. The bleeding remains much less than formerly, although during the past month or two it has been rather more profuse than at the immediately preceding periods. The micturition disturbance also remains improved. During the last two or three periods she has required the catheter once during each period, but for the five preceding months it was not once needed.

Perhaps this case ought to be put in the second category, owing to the pressure symptoms being so prominent, but as the bleeding was also a very marked feature, and especially as it was greatly lessened by puncturing and not by positive cauterization, I thought it well to include it amongst the hæmorrhagic cases. One question I would ask about this case: If electricity had not been available, by what other means could such a good result have been obtained?

Case II.—Mrs J., æt. 34, has had two children, the last born ten and a half years ago. She was admitted to the ward on 16th April 1888, complaining of great weakness, pain in back and legs, and being too much unwell.

For the last six years patient had had menorrhagia, the periods occurring every twenty-eight days and lasting fourteen days, while previously they only lasted three or four. There was also severe dysmenorrhœa, and pain in back and legs constantly. She had been treated three times already in Professor Simpson's ward by ergot, hot douches, vaginal plugging, etc., and although slightly improved on each occasion by this treatment, she quickly relapsed into as bad a condition as before on going home.

On making a vaginal examination, the cervix uteri was found directed downwards and only slightly movable. Through the right fornix a firm, dense mass was felt, connected with the uterus, and evidently a fibroid. It could be felt also slightly through the anterior fornix, and much more distinctly through the posterior. Bimanually a firm mass was felt the size of a four and a half months' pregnancy. It was quite immovable, and tender on pressure. The tumour was apparently connected with the right border and posterior wall of the uterus.

The indication here being to diminish hæmorrhage, the positive pole was introduced into the uterus. She received five positive electro-cauterizations of 100 to 150 mà. from five to ten minutes—*i.e.*, the intra-uterine sound was made positive—between 19th April and 12th May. On the 14th May she suffered greatly from pain in left iliac region and down left leg. Fever soon developed, with diarrhœa and vomiting. On vaginal examination a large mass was found occupying left iliac region, very tender on pressure, and firm

to the touch, so that *a left-sided cellulitis had developed.* The tumour itself was also swelled and very tender.

This complication soon gave way to treatment; but as she was left in a very weak state, she was sent home to get a rest before the electrical applications should be resumed. She was accordingly dismissed on 22nd June 1888, feeling weak, but otherwise very well. The pain in back and down legs was quite away, but it was impossible as yet to say if there was any change in her menstruation. The pelvic condition was unchanged, there being not the slightest alteration in size or consistence of the mass, except, perhaps, that it was a little denser.

Further History.—On 16th August 1889, fourteen months afterwards, I made the following note:—After leaving hospital in June 1888, patient continued in good health till the beginning of 1889, menstruating regularly as before every twenty-eight days, the periods lasting now four instead of fourteen days, the flow being very slight, and the pain almost *nil.* After this the pain began to trouble her again, but comparatively slightly, the bleeding meanwhile remaining pretty natural, till three months ago, when if anything it got a little more profuse, the period lasting five days. Her general health is good, and she feels quite as strong as ever she was.

Per Vaginam.—The tumour is decidedly smaller, being about the size of a three and a half months' pregnancy. It is not painful, is movable, and the sound goes in only $3\frac{1}{4}$ inches. Previously it went in $4\frac{1}{4}$ inches.

Here, then, the hæmorrhage was greatly diminished, and the tumour lessened in size. It is interesting to note that this diminution in the size of the tumour occurred not immediately after the applications, but only after the lapse of some time, which would point, perhaps, to the current having brought about some alteration in the nutrition of the tumour, which resulted in its decrease. At any rate, the effect is clearly different from what takes place in many other cases, when a distinct diminution in the tumour mass immediately follows upon the applications. Then, too, the cellulitic attack is important. Here I must confess it is extremely probable that it was the result of carelessness in introducing the intra-uterine electrode, especially as this was always very difficult, and I was often in a great hurry. It is scarcely possible to account for it in any other way, as the intensity of current was never over 150 mà., and only attained this once. Indeed, I often wondered that this woman's uterus was so tolerant of the rough usage it often got, and that a cellulitis had not been set up long before.

Case III.—M. F., æt. 36, unmarried, no children. Sent by Dr Carmichael to Professor Simpson, and admitted on 12th May 1888. She complains that she is too often unwell.

The patient, who is a cook, menstruated regularly from age of 16 every twenty-eight days for seven days at a time, there being always a considerable flow; but since the beginning of the year she has menstruated every ten or fourteen days for four or five days at a time, and during the last three weeks the flow has been constant. Dr Carmichael attended her throughout this time, but could not diminish the bleeding.

Per Vaginam.—There is a large fibroid mass connected especially with the anterior wall and right border of uterus. It is the size of a four months' pregnancy, and the sound passes in $3\frac{1}{2}$ inches.

Ten positive electro-cauterizations were made, each of 100 mà., and for five minutes—the first on 6th June, and last on 21st August, patient attending as an out-patient for the last two.

Now, during this time she passed through three menstrual periods, the first being after the third application, and lasting five days. This bleeding occurred exactly three weeks from the cessation of the previous one, and was the shortest she had since the beginning of her trouble. The second occurred twenty-five days after this, and lasted only three days—the shortest period in her life! The third occurred again after twenty-five days, and lasted again three days. This ended on 28th August, and on 6th September 1888 her pelvic condition was as follows:—There is a distinct diminution in size of tumour, which now equals about a three months' pregnancy, and is quite movable. Sound passes still $3\frac{1}{2}$ inches.

Her general condition is very much improved, she having gained 1 st. 5 lbs. weight during the four months she has been under observation.

This, then, is a very good result. I am unable to say anything about its permanency, as she has left Edinburgh, and I can find no clue to her whereabouts.

Case IV.—H. F., æt. 57, unmarried. Came to attend as an out-patient on 16th July 1888. No children. She complained of being unwell too frequently, and too much at a time.

Seven years previously this patient passed the menopause, and remained quite well and free of any kind of discharge till one year ago. During her whole menstrual life she had been quite regular in her menstrual habit. But a year ago the bleedings recommenced, being quite irregular in their interval, and lasting two or three days. In November 1887 she had rather a severe flooding, and since that time there has been an almost constant bloody discharge, with an occasional intermission of two or three days at the most. She is exceedingly nervous and alarmed at her condition, especially as all manner of medicinal treatment has failed.

Bimanually a large fibroid is felt, especially affecting the anterior wall and right border of uterus. It is about the size of a five months' pregnancy, lies more to the right side of the middle line,

is freely movable, and not tender on pressure. The sound passes in 4½ inches, and is felt to grate on the roughened and friable uterine mucous membrane. This caused a good deal of bleeding.

Twenty-one positive electro-cauterizations were made between 16th July and 9th October 1888. The intensity at first was 100 mà. for five minutes, but the latter half of the applications were, on the average, 230 mà. for five minutes.

During this course of treatment there was at first no change at all, but gradually the bleeding became less, so that during the last six weeks there was not a drop save after an occasional application, and this ceased in an hour or so.

The tumour became harder in consistence, but its size remained unchanged on 9th October 1888.

The after-history of this case is of great interest.

On 20th December 1889, fourteen months later, I have this note:—Since the battery applications were stopped she has been *entirely free* of discharge, except on three occasions, viz., in March, then four months after this, and a third four months after the second, *i.e.*, six weeks ago. But although I am bound to mention these as discharges of blood, there was the merest trace, amounting to only a few spots on the diaper.

A leucorrhœal discharge, from which also she had suffered, entirely disappeared ten days after cessation of treatment, and has not since reappeared. Her general health is excellent, and she considers herself perfectly well.

Per Vaginam.—The tumour mass is distinctly smaller, but not much. It is also denser and much more easily defined by palpation than before. The sound passes in only 3½ inches, and still causes slight bleeding.

Here, again, hæmorrhage has been stopped, and the tumour diminished. The symptoms in this case were very interesting and unusual, viz., hæmorrhage coming on seven years after the menopause, so that a suspicion of malignant disease arose, and, indeed, this diagnosis had been made by her medical attendant who sent the case to Professor Simpson. Time has, however, I think, verified the diagnosis of fibroid made eighteen months ago. At the present time she is in robust health.

Here, also, no diminution in the size of the tumour could be detected till some time after cessation of treatment.

Case V.—K. Q., æt. 39, unmarried, no children. Was admitted on 14th August 1888, complaining of excessive loss of blood at her periods, which had become very irregular.

This patient dates her illness back to September 1887, to an occasion when she went into the sea to bathe at a time her period was due. This period did not come, nor did she see anything till December 1887, when she had a bleeding which lasted three weeks. An attack, apparently of peritonitis and oöphoritis, now

supervened, and her next period did not occur till the end of May 1888, when she was poorly a fortnight. Since then she has seen nothing. Previous to this, menstruation was regular, of the twenty-eight day type, and lasting four or five days.

On physical examination, a rounded mass is felt through the anterior fornix, and also on palpating hypogastric region of the abdomen. Bimanually this is found to be due to an enlargement of the uterus, which in size equals a three and a half months' pregnancy. The enlargement is chiefly connected with the anterior wall, but the left side is also affected, and at the upper left corner there is a nodule which gives the whole mass a slightly irregular outline. Sound goes in $3\frac{1}{2}$ inches. It can be moved round in utero, showing that the cavity is expanded. It is evidently a fibroid connected with the anterior wall and left side of uterus—partly intra-mural and partly sub-peritoneal. Here the positive pole was tried in utero, although the two months' amenorrhœa seemed almost to indicate the negative.

Ten positive electro-cauterizations were made, the first on 24th August, and the last on 21st October 1888. Average intensity, 200 mà., except the first, which, to test her susceptibility, was only 50 mà. Average duration, five minutes. During this time there were three periods,—1st, on 26th August, lasting seven days; 2nd, on 22nd September, lasting five days; and 3rd, on 29th October, for five days. She went home on 13th November 1888 much improved in her general health, but the pelvic condition was exactly as when she came in—no diminution in size whatever.

Further History.—On 31st July 1889, patient came to report herself. Since going home she has kept very well—as well, she says, as ever she was in her life. The menstrual periods have been regular every month, lasting three days, and unaccompanied by pain. She takes her food well, and has been quite able for her duties as mistress of a girls' school in Yorkshire. Previously she was unfit for this work She is quite satisfied with her condition, and says she would not know she had a tumour at all.

Per Vaginam.—There is no diminution whatever in the size of the mass. Sound still passes $3\frac{1}{2}$ inches.

The manner in which the periods returned with their normal regularity after positive applications is interesting. If the current was the means of bringing this about—and it seems fair to assume this—I am at a loss to explain it. Still, the benefit she derived is undoubted. It must also be noted that there was no diminution in size of the tumour even after nine months; nor was there any increase.

Case VI.—J. H., æt. 45, unmarried, no children. Admitted to ward on 20th August 1888, complaining that she was losing blood almost constantly.

This patient presented an exceedingly anæmic and pinched

appearance. The history was, that up till two and a quarter years before, she had menstruated regularly at intervals of twenty-one days, and from five to seven days at a time; but at this time, while travelling from Italy to London as a lady's-maid, and while poorly, the period lasted for a month. She then remained well for two or three days, when bleeding recommenced, and has continued almost constantly ever since. The hæmorrhage lasts three weeks, then a week's intermission occurs sometimes; but more usually it is two or three days. For the past eighteen months she has been treated by Dr Duddingston Wilson, but to no purpose. Accordingly he sent her to Prof. Simpson.

On physical examination, the uterus is felt to be enlarged to the size of a four months' pregnancy. It lies to the right, and is very soft, so that it is difficult to make out precisely. Most likely there is a fibroid affecting both anterior and posterior walls. The sound passes 3½ inches, and can be moved round in utero.

Eight positive electro-cauterizations—average, 180 mà. for five minutes—were made, the first on 24th August, and the last on 23rd September 1888. On the 28th September she left hospital very suddenly and secretly, so that there was no opportunity of ascertaining her condition. During the course of the treatment, however, the bleeding was very much diminished; after the third application there being scarcely a drop seen.

Further History.—On 2nd December 1889, fifteen months after treatment, Prof. Simpson and I examined the patient, and found the uterine tumour distinctly diminished and firmer to the feel. It was now approximately the size of a three months' pregnancy. She states that, since leaving hospital, she has remained in greatly improved health. The bleeding, although by no means normal, is very much better than it was, so that she has been able for the last six months to follow her occupation as a lady's-maid—a thing utterly impossible before.

Here decrease in size of tumour and diminution of hæmorrhage have followed the treatment. It is very probable that had this woman remained for more applications, the improvement would have been still more marked. As it is, her condition was a vast deal better after the treatment.

Case VII.—M. G., æt. 38, unmarried, has had one child born fourteen years ago. Admitted 12th July 1888, complaining of bleeding from vaginal orifice.

This patient's history is the following:—Up till two years ago, she menstruated regularly from the age of 12½ every twenty-eight days, the periods lasting seven days. At this time she began to lose much more blood every month, the duration remaining as before; but for the past eight months she has been bleeding almost every day, with an interval, sometimes of two days, and once or twice of a fortnight. And during this time, owing to the great

weakness induced, she has been unable to work as a cloth-weaver. She has been treated by Dr Gunn, of Peebles, but without any benefit, and he sent her to Prof. Simpson.

On palpating abdomen, a solid rounded tumour is felt in hypogastric region, its upper border reaching within 2 inches of the umbilicus. At its upper right corner there is a very sensitive rounded nodule, which is probably the right ovary. The rest of the tumour is not sensitive. A bruit is heard over right side of tumour.

Mensuration.—(1.) From upper border of symphysis pubis to upper margin of tumour, 5½ inches. (2.) Transversely from one side of tumour to the other, 6½ inches. (3.) Circumference of abdomen at most prominent part of tumour—*i.e.*, midway between umbilicus and pubis, 32½ inches.

Bimanually, the tumour is felt to be the size of a five months' pregnancy. On the whole it is rounded, but at the upper right corner there is a sensitive walnut-sized nodule (already mentioned), and another is felt on the anterior surface of the tumour, just beneath the abdominal wall. Sound passes 4½ inches.

It is a fibroid, probably intra-mural, with at least one sub-peritoneal nodule (that felt on anterior aspect of the mass), and with the right ovary displayed up to the upper right corner.

This patient got twenty-one positive electro-cauterizations varying from 100 to 250 mà., generally over 200 mà., and lasting for five minutes. The first was on 19th July 1888, and the last on 25th February 1889.

She did not stand the applications very well, as they frequently caused a good deal of pain in the tumour, and also severe frontal headache; besides, she had several angina-like attacks which considerably interfered with the treatment.

The result was that the *bleeding was not at all diminished—the only case of failure in this category.* The tumour was diminished to the size of a four months' pregnancy, measuring 1¼ inches less in the vertical, and ½ inch less in the transverse directions, and ½ inch less in the abdominal circumference. The nodule previously felt on the anterior surface of the mass became much more distinct, and another sub-peritoneal nodule (previously unfelt) was made manifest on the left side of the tumour. The nodule at the upper right extremity had become very sensitive and distinctly larger.

The further history is exceedingly important and interesting. On 17th July 1889—one year after—I found that the tumour was as large as originally, so that it had apparently increased in size since cessation of treatment. During the year she had been losing quite as much blood as before.

As the uterine cavity in this case was expanded, I thought it well to try the carbon electrode of Apostoli in the uterus instead of the thin platinum one which had been previously used, and which might not have cauterized the whole mucous membrane.

She got, therefore, four additional positive applications, varying from 200 to 250 mà., and on each occasion three successive cauterizations were made of three minutes each, so as to include the whole mucous membrane. This, however, had no effect on the bleeding, but the tumour mass was again diminished to the same size as after the previous twenty-one applications. She accordingly went home, but returned on the 5th October 1889 to go to Dr Croom, who recommended removal of the appendages.

On 8th October he operated, finding the nodule at the upper right corner to be the right ovary enlarged to about three times its normal size, and containing a cyst about the size of a walnut. This, with its tube, and the left appendages, which were normal and deep down in the pelvis, were removed, and the patient made a good recovery.

This exceedingly interesting case is also very instructive. It is very probable that the failure of electricity was due to the displaced right ovary, which was always greatly irritated by the abdominal plate. I am almost inclined to think that the electrical applications had much to do with the cystic condition of the ovary —at least in augmenting it—as it was much larger after the treatment than before. Here we have an illustration of the absurdity of supposing that removal of the appendages will always be rendered unnecessary by this new treatment.

Electricity was tried and found wanting, and then the cutting operation became rightly the only alternative. In another similar case, if, after a few applications, there should be no improvement, it would be one's duty to suggest surgical interference. Even if this operation is not followed by cessation of the bleeding, the patient is now in a much more hopeful condition for further applications.

It is important also to note the increase in the size of the tumour mass after the first series of applications ceased (showing that the diminution in size which they had brought about was only temporary), and, secondly, the diminution which was again quickly brought about by the second series.

Case VIII.—Mrs G., æt. 33, admitted 4th September 1888. She has had nine miscarriages and no full-time children. The first occurred fourteen years ago, two years after marriage, and the last two years ago. The time varied from the second to the fifth month. No ascertainable cause, except that in each pregnancy she became very fat, so that it may have been a case of "perverted nutrition" during pregnancy leading to abortion, such as I remember hearing Dr Fordyce Barker describe at the British Medical Association Meeting at Glasgow in 1888. Of course, the fibroid may have been the cause. She came complaining of pain in lower abdomen and being too much unwell, with floodings on several occasions.

The history was, that ten years ago, after a miscarriage at the fifth

month, an attack, apparently of pelvic inflammation, supervened, which kept her in-doors for four months. Since then the pain complained of has never left her. Menstruation began at 13 and continued quite irregularly, with intervals of from two to five weeks, and lasting five days, till the above miscarriage, since which time the amount lost became increased—the duration varying from three to fourteen days—with irregular intervals of two to five weeks as before. On several occasions she has had severe floodings. There is also much difficulty in micturition at times.

Per vaginam, the cervix is situated far back, and is directed downwards and to the left. *Bimanually*, the uterus is found to be enlarged to the size of a three months' pregnancy by a fibroid affecting the anterior wall and right border. The whole mass is inclined to the right, occupying the right iliac fossa. The fibroid is intra-mural. Sound goes in 3¼ inches.

She received thirteen positive electro-cauterizations, each of 200 mà. for five minutes. The first was on 6th September, and the last on 12th November 1888. During this time three periods occurred—the first, after the fourth application, lasting eight days, with quite as much loss as before, the second and third each three days, with a greatly diminished flow.

She stated that she felt very much better in her general health than before, and that her bleeding and pain were decidedly diminished.

Further History.—On 20th August 1889—nine months after treatment—there is the following note:—The bleeding since treatment was stopped has remained greatly diminished, having occurred regularly every twenty-eight days, and lasting four or five days, exactly as she used to be when normal, but that the type is now regular. But the pain in lower abdomen has been quite as bad as before, and there is no difference in the size of the tumour.

Here, then, the bleeding has been diminished, but there has been no alteration in the size of the tumour, nor any alleviation of the pain. Perhaps faradism would have relieved the pain.

B.—The second group includes those **Cases in which Pressure Symptoms were caused,** and in each case the bladder functions were interfered with.

They are three in number; but a fourth case has already been mentioned, and in that case (No. I.) it will be recollected that the bladder symptoms were entirely relieved.

Case IX.—Mrs A., æt. 37, admitted 9th May 1888. Married thirteen years, sterile.

For the last three and a half years she has had great difficulty in making water, on several occasions the catheter being required. This occurs especially at her periods, which have, during this time, been of longer duration (eight days) than before, when they lasted

four days. During the past few months the menorrhagia and difficulty in micturition have been steadily getting worse, so that her present condition is very distressing. During her last period the catheter was used six times.

Per Vaginam.—A large fibroid mass can be felt through all four fornices. It completely blocks the pelvis, and extends up to midway between umbilicus and pubis. Sound passes 4½ inches.

Sixteen positive electro-cauterizations were made, average 170 mà. for five minutes. The first was made on June 6th, and the last on October 8th, 1888. After the first application there was a period of eight days, but for the first time for many months she did not once require the catheter to be passed.

During this time she passed through five periods, the duration of each being, as before, eight days, but the amount lost being less. Only twice was the catheter required. After treatment she had no difficulty in making water at all, and said she would be quite contented if her improved condition would just continue. Her general health was much improved. The tumour felt slightly smaller, but not to any great degree.

Further History.—On 9th October 1889 the patient called to report herself. Since going home the general improvement has continued. She has been losing less blood at the periods, but on one or two occasions it has been necessary to have recourse to the catheter. The best indication of the improvement in this case is, that ever since leaving hospital a year ago, she has been quite able to attend to her household duties, whereas, previous to admission, she was quite unfit for this, owing to pain (which has been entirely relieved) and the disturbance in micturition.

Case X.—E. G., æt. 45, admitted 25th May 1888. Unmarried. No children.

The onset of this patient's condition has been very gradual. Three or four months before admission she began to suffer severe pain across lower abdomen, accompanied by sickness and frequent desire to micturate, which latter symptom has become the most distressing, she having a desire to pass water every quarter of an hour. There has been also a slight—very slight—increase in the monthly loss during this time. *Bimanually*, there is a fibroid filling up the entire pelvis and only slightly movable. The mass extends up 3½ inches above the symphysis pubis. The cervix is directed upwards and forwards, and is situated behind the symphysis. The fibroid is apparently connected with the posterior wall of the uterus.

This patient received sixteen negative electro-punctures between June 6th and October 8th, 1888. The tumour was punctured through its most prominent part in the posterior fornix. The result was very satisfactory. The bladder trouble was relieved, so that she soon desired to pass water no more frequently than before

present condition began. Her periods returned to their normal (and this, again, without any positive cauterization as in case No. I.), and the tumour was very distinctly diminished in size, so that it was possible, on 19th October 1888, to lift it up above the pelvic brim, when an Albert Smith pessary was introduced to keep it up, and she was sent home.

Further History.—On 9th September 1889, eleven months after cessation of treatment, she writes to say that the improvement has continued, but that on one or two occasions (she thinks as the result of cold) there has been a return of her old micturitory disturbance for a day or two.

Case XI.—Mrs D., æt. 48, admitted 11th August 1888. Has had one child, born eleven years ago.

This patient complains of pain in small of back, with great difficulty in micturition, amounting occasionally to retention. These symptoms have existed for the last six months, and are getting worse. There is also incontinence of urine, so that she is constantly wet.

Per Vaginam.—Through the posterior fornix is felt a rounded hard mass bulging into the vagina. The cervix is directed downwards and backwards, is jammed behind the symphysis pubis, and forms a distinct angle with the aforesaid mass. Bimanually, there is evidently a fibroid connected with the posterior wall of the retroflexed uterus. The mass just fills the pelvis, and is quite fixed.

Seventeen applications were made between September 5th and December 30th, 1888, the first eleven being negative punctures, and the last six being negative electro-cauterizations, the average strength of each being 100 mà. for five minutes. The result was that the bladder disturbance was entirely relieved. The pain was slightly improved, and the tumour diminished in size but very slightly.

Further History.—On 10th October 1889—ten months later—the patient reported herself. Since leaving hospital there has been no trouble with her water at all. About four months after leaving she passed, per vaginam, a pear-shaped mass of firm tissue, but, unfortunately, did not keep it. No doubt it was a fibroid which had gradually become extruded by the current, as Apostoli and others have shown is often the case. After this she felt better than ever, and at present enjoys perfect health.

Per vaginam, a great change is noticeable. The mass, which before blocked the pelvis, is now represented by an apparently normally-sized uterus, somewhat bound down to the back and retroflexed. Dr Fordyce, who kindly gave this patient a few applications for me, also examined her, and was greatly struck by the change.

C.—The next group of cases is one in which **Pain was the chief complaint,** and this associated, generally, with a scanty flow.

Case XII.—Mrs L., æt 38, admitted 29th March 1888, married sixteen years. Sterile. Complains of severe dysmenorrhœa, which has existed for seven or eight years.

Her periods last for three days, and are accompanied by severe pain in lower abdomen and left iliac region, so that she is forced to go to bed. The amount of blood lost is very small. Several plans of treatment have been tried without avail.

On physical examination, there is found a large fibroid affecting the anterior wall and left side of uterus, and extending to within ½ inch of the umbilicus, so that the whole mass is about the size almost of a six months' pregnancy. The cervix is directed downwards, backwards, and to the left. The fibroid is subperitoneal. A small nodule is felt—the size of a pigeon's egg—through the anterior fornix on the anterior aspect of the mass. Sound passes in only 2½ inches.

Here it seemed to me that the negative pole, by increasing the menstrual flow, might thereby diminish the pain. Accordingly, she got thirteen negative electro-cauterizations, average 100 mà., for ten minutes, the result being that the three periods which occurred during the treatment were characterized by increased flow and great diminution in the pain. But the next two periods were exactly as they used to be, both as regards amount of discharge and pain, so that no alteration whatever in her condition can be attributed to the electrical treatment. The tumour was not diminished in the slightest.

Case XIII.—Mrs Y., æt. 42, admitted 16th April 1888. Married. No children, one miscarriage fifteen years ago.

Patient came complaining of severe and constant pain in the back and lower abdomen, with difficulty in micturition, leucorrhœa, and severe dysmenorrhœa. They have existed more or less for three years, and on several occasions complete retention has occurred, generally after a drinking bout. She is very alcoholic.

On physical examination, a large fibroid tumour, connected especially with the anterior wall of the uterus, and similar in size to a five months' pregnancy, can be made out. Sound passes in only 2¼ inches. The fibroid is subperitoneal.

Twenty-three applications were made—the first six positive cauterizations, and the rest negative—between 21st April and 3rd October 1888, average 140 mà., for seven minutes.

The result was that the leucorrhœa disappeared; micturition became more easy; but still, on several occasions, while attending as an out-patient, she came with retention brought about by drinking. The menstrual flow was increased, but there was no

diminution in the dysmenorrhœa, although the constant pain in the back and abdomen was quite gone.

Altogether her condition was a very improved one, but she did not give herself a fair chance, owing to her drunken habits.

The tumour was slightly diminished to the size of a four months' pregnancy. It also became denser, and one or two small subperitoneal nodules became manifest, as though they had been extruded from the main mass.

I have heard nothing of her since leaving hospital.

Case XIV.—A. M'L., æt. 44. Unmarried, no children. Was admitted 12th June 1888, complaining of constant pain in lower abdomen and left iliac region, which had existed for three or four years. There had also been slight menorrhagia during that time, which had been getting rather better during the past few months.

On palpating abdomen, three distinct masses can be detected—one a hard round tumour, the size of a goose's egg, in the left iliac region; a second mass, in the right iliac region, about one-third the size of that in the left; and a third, in the middle line, extending to within two inches of the umbilicus. *P.V.* the cervix looks downwards and slightly forwards, and is pushed far back. These three masses can now be felt through the anterior fornix, and are apparently portions of a multiple subperitoneal fibroid connected with the anterior uterine wall, and displacing the uterus backwards. Sound passes in 3 inches.

She received thirteen negative electro-cauterizations—between 18th June and 14th September 1888, average 140 mà., for five minutes—with the result that there was no improvement whatever in the pelvic symptoms, the pain being as bad as before, but she felt very much stronger and more able to go about. No change whatever in the size of the tumour occurred.

Further History.—On 3rd October 1889—twelve months later—I have the following note:—Since the battery was stopped the patient's condition has much improved, there having been no pain at all for many months. For eight months after leaving Hospital her periods were regular every month, lasting eight days, but the amount gradually getting less, menstruation ceased altogether four months ago.

The tumour is distinctly, though slightly, smaller in size. In the middle line it reaches to $2\frac{3}{4}$ inches below umbilicus, *i.e.*, $\frac{3}{4}$ inch lower down than before.

It is quite likely that any improvement in this case is associated with the menopause, and not with the battery.

Case XV.—Mrs F., æt. 40, admitted 13th June 1888. Married fourteen years, no children. Has had two miscarriages, the last eleven years ago. Complains of pain in back and across abdomen, and dysmenorrhœa.

She began to feel ill seven months ago, and consulted Dr Moir, St Andrews, who sent her to Professor Simpson. Previous to this many remedies had been tried, but without success.

Bimanually, one can make out a fibroid, partly intra-mural and partly subperitoneal, connected with the anterior wall and lateral margin of the uterus, and in size similar to a four and a half months' pregnancy. There are at least two small pediculated movable masses, about the size of a walnut, connected with the main mass—one felt in Douglas's pouch, and the other in the right iliac region. Sound, with the aid of volsella, passes in $3\frac{1}{2}$ inches.

Eight negative electro-cauterizations were made—between 23rd June and 31st August 1888—of 120 mà., ten minutes; but, with the exception that the periods were somewhat lengthened, with more loss of blood, there was no alteration whatever either in the symptoms or size of tumour.

This case is not so satisfactory as it might be, owing to the small number of applications, but she could not come longer.

Further History.—On 7th October 1889, she writes saying that her condition has not improved at all since going home, and she contemplates another trial of electricity.

Case XVI.—The next case is one which I bring in at the end of this group, as, although pain was not the chief cause of complaint, yet it was complained of along with a swelling in the abdomen—the only fibroid in the series in which a patient complained of the presence of a tumour directly.

Mrs T., æt. 41, admitted 30th April 1889, complaining of general weakness, pain in abdomen, and swelling of abdomen, all of which have become very manifest during the past six months. Sterile.

Menstruation has occurred regularly every twenty-one days for five days till ten years ago, when the period became lengthened to ten or fourteen days, but latterly this has got better, and quite recently she passed six periods without seeing anything. Last period lasted five days.

On physical examination, a distinct, firm, smooth-surfaced ovoid mass is seen and felt in the hypogastric region. It extends up to the umbilicus, and laterally to the junction of the hypogastric and adjacent iliac regions. It has a soft, doughy feel, and the parietes move freely over it. A distinct bruit can be heard synchronous with the heart. Vertically from pubes to umbilicus the mass measures 8 inches, and transversely 9 inches.

Bimanually it is a large fibroid—intra-mural—and causing enlargement to the size of a six months' pregnancy. It is quite movable. The chief tumour mass seems to be connected with the anterior uterine wall. Sound passes $4\frac{1}{2}$ inches.

Here was a case in which the mere presence of the tumour producing abdominal swelling was causing discomfort. Intending to diminish the size of the mass, I used negative applications, as the

negative pole was supposed to have a greater destroying effect than the positive.

Twenty-five negative electro-cauterizations were made—between 8th May and 3rd October—varying from 100 mà. for ten minutes to 150 mà. for five minutes. The result was that her general health was greatly improved, her face acquired its old natural fresh colour, and for the last month pain was entirely absent.

On 21st October measurements were taken, which showed a diminution in the vertical extent of 2½ inches, and transversely of 3 inches.

Bimanually the mass felt like a four months' pregnancy, freely movable, and of the same consistence as before. The measurements, too, are less, in spite of the fact that there was an increased deposit of fat in the abdominal wall. I would here take the opportunity of referring to the deception that will often arise if implicit reliance be laid on external measurements alone. They are of no use whatever unless in conjunction with bimanual examination, as a tumour impacted in the pelvis getting smaller and rising out of the pelvis somewhat, may give a larger external measurement than before, although much smaller; and *vice versa*. This I have seen occur many times.

Here, then, the greatest diminution in the size of the tumour has occurred,—much greater than in any of the others,—so that mere change in the circumferential zone (which I suppose may surround every tumour more or less), alone, will not account for it. Some other process must also be at work.

Further History.—On 7th October 1889, she writes saying that since going home she has continued in her improved condition. She says,—"If I could live the short time with the same ease as I have done since I left the Infirmary, I would never complain." Her menstruation during this time has been very irregular, several periods having been missed, so that it is quite likely she is at the menopause.

D.—The anomalous group in which **Inflammatory Exudations** are the most important.

Cellulitis posterior binding down Uterus.

Case XVII.—Mrs W., æt. 28, admitted 12th March 1888, complaining of great weakness and discharge from uterus, sometimes red and sometimes white. She has had two children, the last two years ago. Four months ago she caught cold at a period, and has not been free of pain since. The leucorrhœal and metrorrhagic discharge has also existed for the same space of time.

Per Vaginam.—The uterus is retroverted and bound down to the sacral hollow by cellulitic adhesions. The right ovary is very tender, and is prolapsed.

With the object of seeing whether the adhesions could be

removed, I placed a cotton-covered electrode in the posterior fornix, and made it negative. She received six such applications between 13th April and 9th May, varying from 100 to 200 mà., for five minutes. This, however, I found was a mistake, as they caused a shrinking and puckering of the vaginal mucous membrane which was in contact with the pole. In other similar cases I found that an intensity of 50 mà. or less was quite as efficacious, and did not cause any cauterizing.

The result was very satisfactory. The cellulitic deposit cleared up, the uterus became again quite freely movable, and resumed its normal axis, so that, on making a vaginal examination on 30th May 1888, her pelvic condition was normal. The discharge was entirely arrested.

Subinvolution.

Case XVIII.—Mrs T., æt. 32, admitted 22nd May 1888 complaining of pain in lower abdomen. Has had two children, the last born nine years ago. For the past seven years she has been very much troubled with pain in the lower abdomen, which comes on exactly a fortnight after every period, and lasts three days. She traces it to lifting a heavy weight. The uterus is enlarged and subinvoluted, so that the sound goes in $3\frac{1}{2}$ inches.

This, then, was a good opportunity to try the effect of the battery on a case of pure subinvolution, and as the negative pole is the more efficacious in causing absorption, she received seventeen negative electro-cauterizations, between 26th May and 2nd October 1888, of from 50 to 100 mà. for five to ten minutes.

There was not the slightest diminution in the size of the uterus, but the pain was greatly relieved. After the first application she ought, in ordinary course, to have had the pain, but, for the first time for seven years, it was entirely absent. This was the more satisfactory, as everything—drugs, douching, pessaries, etc.—had been tried in vain.

On 25th November 1888 she wrote, "I have had a period since coming home. Fourteen days after it I felt the pain, but not so bad as usual. I am sorry about it coming back again."

Since then I have entirely lost sight of the patient.

Pathological Anteflexion, Peritonitis posterior, and Endometritis.

Case XIX.—Mrs H., æt. 44, admitted 4th June 1889. Has had six children and three miscarriages, the last occurring nine months before, and since which time she has never been free from pain in the right iliac region and a leucorrhœal discharge, which has left her very weak indeed. She has been treated by Drs Barbour and Skene Keith at different times, but without effect.

Per Vaginam.—The uterus is pathologically anteflexed, peritonitic bands being very distinctly felt through the posterior fornix. There is also endometritis.

Ten negative vagino-abdominal applications were made similar to the second last case, of 50 mà. each, the time varying from five to ten minutes. The first was on 9th June, and last on 12th September. The pain and leucorrhœa were entirely removed, but there was no change in the physical condition in the pelvis.

Further History.—This patient remained in very good health—although not quite strong, still much better than before—for nearly a year. She then became pregnant, aborted at the sixth week, and since then has been feeling the pain again. She desires to have the applications renewed, as they brought about such a beneficial change.

Cellulitis.

Case XX.—To this next case I ask your close attention, as it is one of the most important and instructive of the whole series.

Mrs J., æt. 27, *admitted 8th August* 1888. *She has had four children, the last born* 12*th May* 1888. *Four days after the birth of this child she was seized with pain in lower abdomen, and very soon a swelling and hardness became manifest. In spite of treatment, her condition for the next three months got steadily worse, and she then sought admission for extreme weakness and emaciation, with pain and swelling in abdomen. The apparent cause of the attack was cold.*

On making a physical examination, *it was evident there was a large cellulitic mass, which could be felt through the abdominal wall. On palpating this mass, it was felt to be very firm and dense, and painful to the touch. It occupied, like a solid cake, the left iliac and hypogastric regions, and in the middle line extended up to about ¼ inch above the umbilicus. Its upper border extended from this point to the left anterior superior iliac spine, while the right border corresponded to a line drawn with a slight convexity outward, from ¼ inch above the umbilicus to the middle of Poupart's ligament on the right side.*

Bimanually, *this mass of exudation was felt to occupy a somewhat unusual position, viz., the space between the uterus and the anterior abdominal wall, so that, in great part, it surrounded the bladder. The left broad ligament was also filled up. Posteriorly, and to the right, the pelvis was normal.*

The sound passed 3 *inches into the uterus, whose axis was normal, but the whole organ was slightly retroposed by the exudation.*

Here, then, was a case I had long been looking and wishing for—a cellulitic mass so situated that it could be easily felt and mapped out on the abdomen, whose condition and extent, therefore, could be followed with great accuracy from day to day.

To discount any effect the patient's altered circumstances might have on the exudation, she was first put on the ordinary method of treatment for such cases, viz., absolute rest in bed, fomentations, poultices, painting with iodine, and hot douching, with iodide of potash internally. This was continued for a month, but without mak-

ing the slightest impression. For three months previous to admission also, it must be remembered, similar treatment had been adopted in vain.

Now, surely, it was time to try the effect of the current. Accordingly, on 3rd September, with the uterine electrode made positive, an application of 100 *mà. for five minutes was made. This was followed by other fifteen applications, the last four being negative electro-cauterizations, all the others positive. The strength varied from* 100 *to* 150 *mà., and the duration from five to ten minutes. The last was made on 23rd October. With what result? Well, on the 12th September, after three applications, "patient says she feels much stronger, and that the mass is less bulky. She is quite free from pain. The mass has distinctly diminished at its periphery."*

On 17th September (14 *days after the first application*) *the upper limit of the mass in the middle line is* $\frac{1}{2}$ *inch below umbilicus.*

4th Oct.—Mass still diminishing in size. She feels much stronger, and has gained in weight.

24th October.—There is absolutely no pain. The mass is practically entirely gone, there being the merest trace left in the form of a thickening felt vaginally through the left fornix. The uterus is now in its normal position, perfectly free, and the sound passes in only $2\frac{3}{4}$ *inches after repeated trials on different days.*

She is now feeling quite well, able to walk about with perfect ease, and to work, and has gained 1 *stone* 8 *lbs. since the battery was commenced*, i.e., *within the last seven weeks.*

The kind of application was changed on the last four occasions, as the resolution was becoming relatively slow, and I thought that, by substituting the negative pole, it might be hastened. But it made no apparent difference. Here the effect was almost entirely inter-polar.

Since going home on 25th October she has remained quite well.

It is impossible by writing to give an accurate idea of the benefit this woman derived from the electrical current. Everything else had been tried, and in the absence of this new method we would have been powerless.

Cellulitis.

Case XXI.—Mrs I. M'K., æt. 50, admitted 6th September 1888, complaining of pain in back and right iliac region, and being too much unwell. She has had one child, born twenty years ago, followed by a miscarriage eighteen months later. She had been a widow for twelve years.

The patient enjoyed good health till six years ago, when she was attacked quite suddenly with severe pain in the right iliac region. The menstrual period, which occurred at this time, was lengthened to seven days, the duration previously having been five. Ever since this attack the pain has persisted and extended round to the back. The periods have gradually got longer, till now they last

ten days, and for the past two or three months she has scarcely been free from bleeding a single day.

She has been treated at different times during her illness, but without benefit. Lately she has been getting very much emaciated and anæmic, her appearance suggesting malignant disease.

On physical examination, the uterus is found lying to the front, normal in size and position. Sound passes in 2½ inches.

Through the posterior and right fornices a firm, dense mass is felt occupying the right iliac fossa. It is very dense and somewhat tender. The surface, felt through the fornices, is slightly irregular, with small nodular elevations. It is quite fixed, and binds the cervix to the right somewhat, while the uterine body is fairly movable. In size the mass is rather less than a three months' pregnancy.

There was some doubt as to the diagnosis, my own impression being that it was either a cellulitic deposit or old hæmatoma, most probably the former. Two eminent gynæcologists who saw the case differed from me and from each other, the one thinking it was a fibroid, and the other a case of malignant ovarian disease.

Hoping it might turn out to be inflammatory, she was tried with negative applications. The internal electrode, in the form of a cotton covered electrode, was tried, wrung out of a weak saline solution, and placed in the vagina at the junction of the posterior and right fornices. But in case no good should result, and as the bleeding would be going on meanwhile, I thought it might be good to try intra-uterine positive applications as well.

Accordingly four double applications were given, first a negative vagino-abdominal application, average 100 mà., for five minutes, to remove the supposed exudation, followed by an intra-uterine positive application, of average 150 mà. for five minutes, to stay the bleeding. The first was made on 6th September, and the last on 17th September, and after the first application there was not a drop of blood lost. The mass also steadily diminished in size, so that after three more negative vagino-abdominal applications—the last on 2nd November—she left the Hospital on 5th November 1888, with *the mass entirely gone*, there being not the slightest trace left. There had been absolutely no bleeding since the first application was made, and the pain for several weeks had been entirely absent.

Further History.—On 4th October 1889, eleven months after cessation of treatment, she writes to say that since leaving Hospital last November she has remained well. She has passed only four periods—in April, May, August, and October—with considerable loss each time, but no pain. Most likely this irregularity is connected with the menopause. She has enjoyed perfect health, and whereas before she was quite unable to work, she has been occupied since April as housekeeper in a large house. And she writes: "I have never been a day off duty. I have a good deal of running

about. I am housekeeper here, and have many duties, as the hunting season has begun, and we keep a good deal of company."

This case, then, is not only satisfactory, but instructive. It affords, perhaps, a clue to some of those fibroids which are said to be dissipated by the electrical current. For, had the gynæcologist who made the diagnosis of fibroid stuck to this opinion, then to him it would have been an instance of a fibroid entirely removed by the current. And so it is possible that many similar cases may be the result of a mistaken diagnosis.

The case was, I have very little doubt, most likely a cellulitic deposit, although it is impossible to entirely exclude the possibility of hæmatoma in the right broad ligament.

Cellulitic Deposit surrounding Piece of Ovary.

Case XXII.—Mrs. R., æt. 38, was admitted on 5th September 1888, to have a plastic operation done for a large ventral hernia that had resulted from a previous laparotomy.

Two years previously her appendages had been removed by a South Shields doctor for pain in both iliac regions. The result of this was that menstruation, previously of the twenty-eight day type, became irregular, the intervals varying from seven to thirteen weeks. The pain has persisted in the right iliac region ever since the operation, but there has been no return of that previously felt in the left side. She has had eleven children, the last born four years ago.

Per vaginam a small nodule, scarcely the size of a walnut, can be felt through the right fornix. It is exquisitely tender to the touch, and is no doubt the cause of her pain.

Thinking that most likely a small portion of the right ovary had been left, and had become surrounded and pressed upon by condensed cellulitic tissue, it seemed that negative vagino-abdominal applications might dissipate the inflammatory tissue. Accordingly the vaginal cotton-covered electrode was placed in the right fornix, and six applications made, each of 100 mà., for five minutes—the first on 6th September, and the last on 3rd October 1888.

The little mass became distinctly smaller in size, and could be pressed upon without causing any but the slightest pain. After the fourth application the pain in the right iliac region entirely left her.

Further History.—On 6th October 1889 she writes to say that the pain remained entirely away for nearly three months. After that it again began to bother her, and has continued to do so till now. She therefore writes, and intends coming back for more applications. The plastic operation was not a success.

Old Peritonitic Adhesions binding down Uterus and Left Appendages.

Case XXIII. — C. I., æt. 24, admitted 20th April 1888. Single. Has had one child, born a year ago.

Ever since the birth of her child she has been constantly troubled with pain in back and left iliac region, which nothing has been able to check. She felt it slightly during the latter half of her pregnancy, but it is only since the labour that it has grown so troublesome. She is a weak, anæmic girl, who has suffered much from rheumatism, and now has well-marked mitral disease. There is no evidence that she has ever suffered from gonorrhœa, but it is very probable.

Per vaginam the uterus is felt bound down to the sacral hollow and fixed by old peritonitic adhesions. The left ovary is prolapsed and enlarged, and exquisitely tender. It is surrounded by old inflammatory products.

Vagino-abdominal applications with the internal cotton-covered electrode placed in the posterior fornix were made. They were six in number, the first two being positive, the rest negative, average strength 80 mà. for seven minutes. The first was made on 21st May, and the last on 30th September.

Great pain was always caused by placing the internal electrode in position, so that her condition was aggravated rather than relieved by each application, and the treatment had to be given up without the slightest alteration either in the pain or in the pelvic physical condition.

Having seen at M. Apostoli's clinic in Paris the excellent results following faradic applications in cases of severe ovarian pain, I think now that this case might have been benefited by them, but probably not to any great extent either, as the sequel will show.

For her *further history* is very important. About the beginning of September 1889 she was admitted to Dr Croom's ward in the Royal Infirmary, when an attempt was made to remove the appendages, as her condition was as bad as before, and she had suffered great pain during the whole year,—this being now the only chance left. Those of the right side were easily removed, but it was found impossible to get at those on the left, there was so much matting of the tissues. She died on 19th September, apparently of exhaustion.

An autopsy was made next day, and the following condition revealed:—The uterus and left appendages are bound down by old peritonitic adhesions, the fundus being bound immovably to the back and right. The stump of the pedicle is seen on the right side to be firmly attached to small intestine by recent adhesions. On the left side it is impossible to make out ovary or tube by looking into the pelvis, but on feeling with the fingers and pinching up the matted tissue to the left of the uterus, they can both be felt, the tube thickened and the ovary small in size and prolapsed. From the left side of the uterus the left round ligament is clearly seen running outwards and forwards. There are also to be seen vessels running downwards and forwards from behind the left broad ligament. These at first looked like the left Fallopian tube, but turned

out to be bloodvessels. The left tube and ovary lie beneath these, and can only be felt, not seen. The small intestines are adherent by recent lymph to the upper border of the posterior and right lateral walls of the pelvis.

From this it will be seen how unlikely it was that anything could have permanently alleviated the pain due to the condition of the left appendages. This case contrasts well with No. XVII., in which, however, the condition was not of such long standing, and the adhesions were probably cellulitic, and not peritonitic. This latter distinction is, I think, of some importance.

Resumé.

Such, then, are the cases, and I would summarize in a few sentences the most important facts:—

1. There are 23 cases in all, and in each the constant current has been employed, necessitating 304 applications. Of these 41 were punctures — always negative; 125 were positive intra-uterine cauterizations; 103 negative intra-uterine cauterizations; and 35 vaginal applications with non-metallic electrode.

2. Eight cases were hæmorrhagic fibroids; seven were treated by positive intra-uterine applications, and one by negative puncture, as it was impossible to get a sound into the uterus.

3. In all but one the hæmorrhage was arrested, and the improvement maintained for at least a year after treatment. For this one exception a distinct and satisfactory cause was found.

4. It therefore appears that hæmorrhage may be diminished by a form of application other than positive cauterization, more observations being required on this point.

5. There were three cases—four really, if we include one of the hæmorrhagic cases—in which pressure symptoms, especially connected with the bladder functions, required treatment. All were greatly benefited, the improvement being apparently permanent.

6. Next there is a group of fibroids in which pain, especially at the periods, is the chief symptom. These seem to have not at all benefited by the constant current either physically or symptomatically (perhaps with the exception of one, which was slightly improved). These were mostly subperitoneal, and were treated by negative intra-uterine applications.

7. Of the 16 fibroids treated, in no case was the tumour entirely removed; but in 11 there was a diminution in size. In 1 only was this to any great extent, the amount of diminution in the others being insignificant, though appreciable to the touch; 5 were entirely unaffected, except that no increase in size could be detected. In 2 of these 5 the symptoms were relieved, and permanently; in the other 3 there was no relief.

8. The kind of application made no difference, so far as diminution in size is concerned, *i.e.*, whether positive intra-uterine, negative intra-uterine, or negative puncture. In some the diminu-

tion was apparent after a few applications, in others not till several months had elapsed after cessation of treatment.

9. Obstinate cellulitic deposits were removed by the constant current, but it appeared to have little or no effect on peritonitic adhesions.

10. In one case of subinvolution, where pain was a source of constant anxiety, the pain was relieved; but no effect produced on the size of the uterus by negative intra-uterine applications.

11. One case of pathological anteflexion with endo-metritis, which had resisted other remedies, was much improved symptomatically, but unaltered physically, by vaginal applications.

12. All patients, whether the pelvic condition was improved or not, felt much better in their general health after a few applications.

This, then, is the sum total of the whole—that symptoms caused by fibroid tumours were almost always relieved, at least hæmorrhage and pressure symptoms, while the tumour itself was diminished in size, and perhaps had its growth arrested; but to verify this more time must be allowed to elapse. Unmistakably, also, the constant current was found a powerful agent in causing the absorption of cellulitic exudations. I believe this will yet be found to be one of the most important indications for its use.

Further than this, from personal trial, I am unable to go; but desiring to see for myself how things were worked at the fountain-head, I went to Paris just after finishing this series of cases, and regularly attended for the space of three months the cliniques of M. Apostoli. It would take too much time to give even a short account of all I saw there; but I take this opportunity of recording the great obligation I am under to M. Apostoli for his great kindness and courtesy, and for the trouble and inconvenience he was always so willing to undergo for the purpose of explaining his methods. In the main I found that I had been pursuing exactly the same method in so far as the kind of application went, but at his clinique the variety of cases treated was very great. Here it would be out of place to criticise the cases, as they have not yet been published, but on the whole the results he obtained were so far exactly as I am pleased to be able to corroborate. Other cases—such as salpingitis, endometritis, etc.—were treated very successfully, but these could, I am sure, have been equally benefited by less tedious and difficult means; but I was much struck by the beneficial effect of faradic applications for ovarian pain.

And now it seems that the constant current must take a place in the treatment of some very important gynæcological affections; its efficacy in relieving the distressing symptoms of fibroids is a fact about which all who have given the remedy a fair trial agree. What place must we then assign to it? It is plain that simply

because it can arrest hæmorrhage it is not to be used in all bleeding fibroids, as most of these are effectively treated by ergot and like drugs. But some will fail to be cured medicinally. Such were the eight cases I have recorded to-night. For these a few years ago there was nothing left but operative interference; but now it has only been necessary to operate on one. And this is precisely the sphere in which the new treatment will find its greatest usefulness—in diminishing the number of fibroids requiring operation, for some of a surety must still require the surgeon. As a hæmostatic, then, it should be ranked with ergot; but with this great recommendation, that many cases unaffected by the drug will be cured by the current.

True, it is very troublesome and tedious, much more so than any surgical operation. Such is the opinion of those who ought to know; but I cannot help thinking that any treatment whatever, no matter how tedious to the practitioner, if successful, is better gynæcological practice than an operation for removal either of the appendages or of the uterus itself, which must always be done with great reluctance, and only because everything else has been tried. If electricity has not, then everything else has not been tried. And here it is that the question of mortality has been raised. I can scarcely conceive that the mortality attending this new method of treatment can ever be compared with even the best operative statistics. Here especially it is necessary to have a full record of the fatal cases, so that one may see how much blame is to be attached to the method and how much to the operator; for several deaths, generally supposed to have been caused by electricity, have, when inquired into closely, turned out to be due either to carelessness or ignorance, or to be merely accidentally associated with the electrical treatment. Thus it becomes important not only to have statistics or results, but also details of cases—the working out of results—so that each one may see and judge for himself.

In the second place, it is clearly indicated as a means of treatment in all cases where the tumour blocks the pelvis, causing pressure symptoms. Here there is nothing—absolutely nothing—that can for a moment compare with the electrical treatment.

Beyond these two classes of fibroids I am unable to proceed. It may be that as the method becomes more fully developed, it will be found useful in other cases. As yet there seems little evidence of this.

Now we pass to another group of cases—cellulitis—for which the constant current seems destined to hold a high place as a remedial measure. Here, again, many (but I do not think most) cases get well with ordinary antiphlogistic treatment. But those that do not, can nothing be done for them? Happily, as these cases show, we have still a powerful means at our disposal in the constant current. I am sorry to say I have not had such a happy result with peritonitic adhesions.

Many other pelvic conditions may be best treated by the constant current. Of these I have not had enough experience to speak with certainty. There would appear, however, to be some cases in which, after ordinary remedies have failed to relieve, the constant current has the desired effect, so that it should always be kept in mind as a possible necessity.

I would like next to make a few remarks about the *method of procedure*, and about the *rationale* of the treatment.

The Method of Procedure.

Into this part of the subject I do not propose fully to enter. It is already sufficiently understood by all. But a few practical points that have cropped up from time to time may be useful.

The intra-uterine applications are nearly always made with a platinum electrode. But for hæmorrhagic cases which are not improving, or where the uterine cavity is expanded, so that the whole mucous membrane may not be cauterized by the platinum, *Apostoli's graduated carbon-pointed electrodes are indispensable.*

For puncture, steel trocars are used. Apostoli lays down the rule—1st, *That punctures should by choice be made when a portion of the tumour presents through the posterior fornix, and always of necessity when it is impossible to pass a sound into the uterus;* 2nd, *That punctures should never be made except through the posterior fornix; and,* 3rd, *The needle should be pushed into the tumour to the extent of only half an inch.* Sometimes I found that there was a distinct cellular deposit round the tumour, and that if by chance the trocar did not pass beyond this, great pain was caused by the application. Generally, a feeling of greater resistance will tell the operator when the tumour is reached; and it should be punctured to the depth of half an inch. These applications are generally negative, but may be positive if the negative ones are too painful.

Sometimes—as when we wish to cause the absorption of an exudation—the internal electrode is in the vagina, and not intra-uterine. In this case its end is covered with cotton wool, to prevent cauterization of the vaginal mucous membrane. As it is, care must be taken not to use too high an intensity—50 mà. or less is quite sufficient—lest a shrinking and corrugation of the mucous membrane result. The vaginal electrode is generally made negative; but it is the effect of the interpolar current which is desired.

Punctures, as a matter of precaution, are better made not oftener than once a week, by which time the previous wound is almost healed. Some puncture oftener, but I think it is attended with risk. Other applications may be made about five times in the fortnight.

With regard to the flat inactive abdominal electrode, which Apostoli still makes of sculptor's clay covered with tarlatan, I have made use of a form originally devised by Engelman of St

Louis, viz., a plate of perforated zinc alloy, on which is quilted, about an inch thick, ordinary absorbent cotton. This is steeped in a warm, weak saline solution, and wrung dry just before application. Engelman advised that no salt should be put in the water, but this is a mistake. This form of electrode, like many others, is quite as good as the clay one, and far less disagreeable to the patient, as it is warm and clean.

Antiseptic douches should be used before and after each application.

I did not find a rheostat necessary, as the patients were quite able to bear the addition of one cell at a time.

It is well also to remember the caution with which all external measurements should be accepted as an indication of the size of a tumour. They must always be combined with bimanual examination.

So, too, measurements of the uterine cavity with the sound are apt to be very fallacious, and, alone, cannot be taken as evidence of the size of the uterine mass. This is owing to the great difficulty often experienced in passing the sound the whole way. It is a point also referred to by Dr Keith.

No great knowledge of electricity is required in making these applications. Of course, an acquaintance with the elements of electricity is necessary. Ability to make an accurate diagnosis, the requisite manual dexterity, such as is required for ordinary gynæcological manipulations, and a knowledge of what the electrical current is capable of doing, so that the proper kind of application may be made in each particular instance—these are absolutely essential.

Danger.

The alleged danger of these applications I have not seen. With ordinary care, and with antiseptic precautions, there appears to me to be no danger whatever. Some cases may require to remain in bed during the treatment, but the great majority can come for applications, and after resting for an hour or so walk home with little or no inconvenience. Some of my cases came regularly a two or three hours' journey by train, and went home again after each application.

Septicæmia, as a result of puncture, is to be prevented by antiseptic douching, and by making the applications not too frequently.

In one of my cases cellulitis was set up, but, as already mentioned, for this I was entirely to blame, having used the sound without sufficient care and gentleness.

Certain minor effects are frequently caused by the applications. These are—

1. *Headache,* which commonly lasts for two or three hours. It is relieved by 10 grain doses of antipyrin. Dr Keith uses iodide of potassium.

2. *A feeling of bodily weariness and lassitude*, which soon passes off, giving place next day to a feeling of greater well-being than before, as a rule.

3. *A bloody discharge is often set up* by the introduction of the intra-uterine electrode. This soon stops, but may be followed for a day or two by a dirty-grayish, semi-bloody flux. And in bleeding fibroids, it may be that, for the first week or two of treatment, the flow is increased, so that one might give it up in despair, concluding that it had actually increased the hæmorrhage, whereas if the applications be continued a little longer it soon stops. This is of great importance, and should be borne in mind.

4. *Pain in the abdomen*, and especially over the fibroid, apparently due to a slight inflammation in the tumour, is not uncommon. It usually subsides in the course of twenty-four hours, and requires no treatment. A fresh application should not be made until it has entirely ceased.

5. It is generally supposed that a *sudden breaking of the current* is very disastrous. Twice, accidentally, it was broken at 200 mà., and once at 250 mà., but, beyond causing a slight shock, did no harm.

6. *Hæmorrhage may follow punctures.* This is easily arrested by hot douches or packing. It is to be avoided by puncturing through the posterior fornix only, and by feeling first with the tip of the finger to make sure that no vessel pulsates at the spot selected.

Rationale.

While originally intending to steer clear of this subject, as it can only be a matter of speculation, I hope, nevertheless, to keep still within the sphere of observation and fact, by simply trying to interpret some of the results.

It is generally admitted that the effects of the constant current may be divided into two groups: first, that due to the passage of the current between the two poles, the inter-polar effect; and, second, that due to the localized action of the active internal pole, according as it is negative or positive. The difficulty commences when an attempt is made to explain these effects. Turn for a moment to each of the categories of cases, and see how the facts correspond with the statements made.

Firstly, *the Bleeding Fibroids.*—Here, unquestionably, I can confirm the statement that the positive metallic electrode in utero has the power of arresting hæmorrhage. It is clearly hæmostatic, as every one is agreed. But Cases I. and X., in which hæmorrhage was greatly diminished by negative puncture, show that the inter-polar current may also be able to arrest hæmorrhage.

Secondly, *Relief of Pressure Symptoms.*—This apparently can be accounted for by the diminution in size of the tumour mass, which

is a constant accompaniment. How this diminution occurs will be seen presently.

Thirdly, *the negative metallic pole* in utero does tend to increase the amount of blood lost at the periods, but this effect, in many cases, has been only temporary, I think, and at any rate has made little difference in the dysmenorrhœa.

Fourthly, *How does Diminution in Size of the Tumour occur?*—This is *the* question which has excited most discussion and speculation, and is a point that can be satisfactorily determined only by experiment. Whether the electrical current can entirely dissipate a fibroid or not I am unable to say. I have never seen it happen, and Apostoli, with his vast experience, acknowledges its extreme rarity. But *diminution* in the size of the tumour *mass* is an undoubted fact. This is apparently an inter-polar effect entirely, but how it occurs I cannot pretend to say. Eleven of these sixteen cases underwent diminution,—slight, no doubt, but still appreciable. In only one case was it so great that it could not be accounted for partly by the contraction and hardening of the tumour which follow the applications, and which, therefore, leave it harder and slightly smaller than before. As a result of this, also, any nodules near the external surface of the uterus tend to become subperitoneal by being gradually extruded, and those towards the interior become submucous, often pediculated, and may be expelled per vaginam. This, then, is the first factor in the diminution. The second one, which is purely theoretical, is therefore of correspondingly little value. As it is closely allied to the action which takes place in the process of absorption in *cellulitic cases*, let us look at them for a minute.

Lastly, *Cellulitis.*—The inter-polar current is here most probably the sole agent, and it acts, apparently, by stimulating and hastening (but in what way is doubtful) the process of absorption which occurs naturally. This effect is perhaps produced through the medium of the bloodvessels or nerves.

May not a similar process partly account for the diminution of fibroids? Here it is necessary to suppose that the new growth is surrounded by a zone of inflammatory tissue either in the stage of congestion or of exudation, either of which conditions the passage of an electric current will modify, so that a diminution in the bulk of that zone will result, and so the whole mass become smaller.

I am not seeking to deny the possibility of electrolysis occurring in the new growth tissue. It seems, however, very improbable, but direct experiment is the only way either to confirm or disprove it, and such experiment must, on account of its nature, be almost impossible.

What I do wish to point out is this—that the diminution in the size of the tumour in this series of cases is so slight comparatively, that it is not necessary to suppose that any destruction of tumour

tissue has taken place. This may have happened; it is impossible either to prove or disprove it. But if such an explanation as the one I have given is possible and likely, then it will be quite enough to account for all the decrease that has occurred,—except, perhaps, in one case, No. XVI., where the reduction in size was so great as to make this explanation not quite so satisfactory. But even here it is quite possible.

Further, the constant current acts as a *tonic*, so that patients feel much better and stronger, often before any change has occurred in the pelvic condition, either physically or symptomatically.

Then, too, it *relieves pain*, just as happens in other parts of the body. But for this the constant is far inferior to the interrupted current. This is doubtless an action on the nerves.

The communication contains very little that is new or original, being mainly corroborative. It is an honest attempt to record in a fair, unbiassed manner a trial of the new agent which threatens to revolutionize gynæcological practice. If I have succeeded, even in the slightest degree, in adding to the reliable information on the subject, my object is fulfilled.

I have to thank Dr Fordyce for kindly finishing some of the cases when I left Edinburgh, and must record the deep obligation I feel under to Professor Simpson, for whom the work was undertaken, and without whose kind and generous assistance it would have been impossible to accomplish.

Discussion upon this paper was postponed.

Meeting IV.—February 12, 1890.

Dr Berry Hart, *President, in the Chair.*

I. *Dr J. D. Williams* showed—(*a.*) A specimen of FOREIGN BODY IN THE POUCH OF DOUGLAS. This was taken from a woman æt. 32, the mother of four children. She was admitted into the Royal Infirmary suffering from swelling of the legs and dropsy of the abdomen in August 1888, and discharged in October. She was readmitted in February 1889, and died a few days after admission of heart disease. During her stay in the Hospital she was tapped four times for abdominal dropsy, and three times by her medical attendant during the interval she was at home. All the

operations were performed through the abdominal wall. At the autopsy, on examining the pouch of Douglas, a piece of a Southey's draining-tube about three-quarters of an inch long was found on the right side close to the right utero-sacral fold. It was held in position by a series of delicate adhesions, some of which had pushed themselves through its side apertures to join together in its lumen. It was not encapsuled. In the fresh condition the surrounding peritoneum was covered with a brownish-black pigment. Probably in this case a Southey's tube was used to drain the abdomen; it broke in position, and the broken bit slipped into the abdominal cavity and gravitated to the pelvis. It must have been in the pelvis for at least three months. An interesting case of foreign body in the pelvic cavity is recorded by Dr Freund of Strasburg in the *Centralblatt für Gynäkologie* (17th December), where a hairpin was found in the course of an exploratory operation for suspected disease of the uterine appendages. The patient, who had symptoms of tertiary syphilis, was 41 years of age. Her period had been regular till about four months before she first applied for hospital relief; then it did not appear for two months; at the end of that period metrorrhagia set in, with spasmodic pains in the sacral region and hypogastrium. The discharge of blood continued for five weeks, then epileptiform fits occurred. The uterus was found anteverted, and a small oval tumour lay to its left side, connected by a tough cord to the pelvic wall. Tubal pregnancy was suspected. In the substance of this tumour a piece of hairpin an inch long, and consisting of part of the two shanks pressed close together just below their point of union, was discovered. Dr Freund points out that in this case the shanks of the hairpin had been pressed together, and probably introduced into the uterus for the destruction of the imaginary fœtus, amenorrhœa having followed cohabitation. The pin had broken, found its way into the left tube, set up salpingitis, perforated the tube, and reached the omentum. (*b.*) A specimen of ACCESSORY FIMBRIATED END OF THE FALLOPIAN TUBE. This was removed from a patient that died of cerebral hæmorrhage at the Royal Infirmary in June 1889. She was 55 years of age, and had borne several children. The right tube, to which the accessory orifice is attached, is 11·2 cm. in length. The portion of tube between the two openings is about 1·3 cm. in length, and is much narrower—only measures half a centimetre in width—than that on the uterine side of the secondary opening, which measures 1 cm. There are two or three small pea-sized cysts in the serous covering of the tube. The lumen is normally patent. The veins of the broad ligament are quite healthy. A small pedunculated cyst is suspended from the tubes of Kobelt.

II. *Dr J. W. Ballantyne* exhibited a SYPHILITIC LIVER, showing

miliary gummata, from a new-born infant. The mother of the infant had been six or seven times under treatment for syphilis, primary and secondary, in the Lock Wards of the Royal Infirmary, and the infant, which was still-born, showed all the outward signs of congenital syphilis. On opening the abdomen, it was seen that the liver was markedly diseased. The organ was larger than normal; it had a dark reddish-brown colour, and had a marked elastic feeling, and scattered over the exposed surface were large numbers of small, round, yellowish-white spots resembling grains of semolina. These appearances were evident also on the cut surface of the liver, and it was to be noted that the grain-like bodies had a diameter seldom greater than a millimeter, and that they could not be picked out of the liver tissue, being intimately connected with it. The gall bladder was found to be small and collapsed, and almost entirely hidden from view by the right lobe of the liver. Microscopic examination showed that there was an increase in the interlobular connective tissue and in that surrounding the branches of the portal vein. The liver cells were very granular, but were not fatty, and at certain points, especially immediately under Glisson's capsule and in the interlobular spaces, were groups of granular cells, surrounded by small, round lymphoid cells and by a fibrous capsule. Sometimes the centre of one of these groups of cells had a caseated appearance, and in many of them acicular crystals like those of margarine could be clearly seen. These groups of cells with caseated centres constituted the little whitish grains which were visible to the naked eye.

III. *Dr F. W. N. Haultain* exhibited a specimen of RUPTURE OF THE BLADDER, the result of retention of urine caused by retroversion of the gravid uterus at the fourth month. The retention of urine had lasted only ten days. He specially pointed out that the rupture was secondary to gangrene of the organ, the edges of the rupture being black and gangrenous. He also drew attention to the fortunate rarity of the condition, only about a dozen records of such lesions having been published, and thought that the lesion probably resulted from a localized necrosis due to complete arrest of the circulation from thrombosis of the veins in that portion of the bladder wall. The thickened, congested state of the bladder wall in general, and the somewhat rapid localized gangrenous area, he considered went a long way to corroborate the theory of arrest of the venous return being the prime factor in vesical gangrene in cases of retention of urine.

IV. THE DISPOSITION OF THE PUBIC SEGMENT IN PREGNANCY AND IN LABOUR.

By J. C. Webster, M.B., C.M.

My reason for bringing forward this already much-discussed question is a twofold one. In the first place, considerable uncertainty has been raised in the minds of many regarding this subject, owing to the recent criticisms by Dr Symington and others of the view first brought forward by Dr Berry Hart, and for some years accepted as the correct one; and, secondly, I am able to present the subject in a new light, and to adduce new facts of the greatest value in solving certain points which have hitherto been obscure.

As to the change undergone by the pubic segment during labour, Dr Berry Hart, on the one hand, says in one[1] of his latest papers that "the pubic segment is drawn up in part into the abdomen during labour," and that though this occurs most markedly in the second stage it takes place also during the first stage; and he attributes this drawing-up to the upward tension of uterine retraction. On the other hand, Dr Symington[2] rather thinks that "the pubic segment is pushed downwards and forwards under the pubic arch," and that "the bladder is the only part of Hart's pubic segment that is not depressed."

During the last year I have been able, in conjunction with Dr Barbour, to study four *cadavera* in the following conditions:—

1. Pregnancy at the beginning of the eighth month;
2. Labour at the commencement of the first stage;
3. Labour late in the second stage;
4. Labour at the end of the third stage.

These were examined by means of frozen sections and casts.[3]

In regard to the disposition of the pubic segment, I have made a special study of these as well as of all the other cases previously published. I have arranged in tabular form the facts acquired by comparative measurements in regard to the following points:—

1. The pelvic floor projection and skin distance between the coccyx and the lower border of the symphysis pubis;
2. Change in the position of the urethral orifice;
3. Change in the position of the junction of the urethra with the bladder (base of bladder);
4. Thickness of the tissue between the lower margin of the symphysis and the vagina in line with the vertical axis of the former;

[1] *Obstet. Trans.*, vol. xiv. p. 66. [2] *Ibid.*, pp. 61, 62.

[3] A full description of these by Dr Barbour and myself will be found in the *Laboratory Reports*, Royal College of Physicians, vol. ii.

5. The depth of the utero-vesical pouch of peritoneum;
6. The position of the os externum and os internum.
7. Changes in the relation of the junction of urethra and bladder (base of bladder) and the cervix to the pubes and to one another.

I have estimated these points in relation to the brim and the vertical axis of the symphysis.

TABLE I.—*The Pelvic Floor Projection and Skin Distance from Coccyx to Lower Margin of Symphysis.*

Stage.	Whose Section.	Pelvic Floor Projection.	Skin Distance from Coccyx to Symphysis.
		In.	In.
Nullipara,	Average,	1	5·3
Pregnancy, 8th mo.	Barbour & Webster's,	2	$6\frac{1}{2}$
„ 9th mo.	Braune's,	$3\frac{3}{4}$	10
„ 9th mo.	Waldeyer's,[1]	$2\frac{1}{2}$ (about)	$7\frac{1}{2}$ (about)
First stage,	Barbour & Webster's,	$1\frac{3}{4}$	$6\frac{1}{2}$
„	Winter's,	$2\frac{1}{4}$	$6\frac{1}{2}$
„	Schroeder's,	$3\frac{1}{2}$	$8\frac{3}{4}$
„	Barbour's,	$1\frac{3}{4}$	$5\frac{1}{2}$
Second stage,	Braune's,	$3\frac{5}{8}$	$9\frac{1}{4}$
„	Chiari's,	$2\frac{1}{2}$	$7\frac{1}{4}$
„	Barbour & Webster's,	2	$6\frac{1}{2}$

(In the other published sections the coccyx is not indicated, so that accurate measurements cannot be made.)

This table shows that the pelvic floor projection is greatly increased in pregnancy, that in the early part of the first stage there is scarcely any change, that in the first part of the second stage while the bag of membranes persists it is probably increased, and that later, while the head is low down it is diminished because of the coccyx being pushed downwards and backwards.

The following table shows that the urethral orifice in pregnancy is on a lower level, and considerably in front of the plane occupied by it in the nulliparous condition; that in the first stage of labour it is on a somewhat higher level, and that it is not anterior (probably slightly posterior) to the position occupied by it at the end of pregnancy; that during the second stage it occupies a still higher level, and that, while an abnormally long-persisting bag of membranes may cause it to appear scarcely moved at all backwards, in the more normal condition of the parts it is posterior to the plane occupied by it during the first stage.

[1] Owing to a fracture of the pelvis the parts are displaced slightly—probably downwards and forwards.

TABLE II.—*Change in the Position of the Urethral Orifice.*

Stage.	Whose Case.	Distance in Front of the Vertical Axis of the Pubes.	Distance below Brim.	Distance below Lower Edge of Symphysis.
		In.	In.	In.
Nullipara,	Average,	$\frac{1}{4}$	$2\frac{1}{4}$–$\frac{1}{2}$	$\frac{1}{4}$
Pregnancy, 8th mo.[1]	Barbour & Webster's,	$\frac{3}{4}$	$2\frac{5}{8}$	$1\frac{1}{4}$
,, 9th mo.	Braune's,	$1\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{1}{4}$
,, 9th mo.	Waldeyer's,	$\frac{3}{4}$	$3\frac{1}{8}$	$(1\frac{1}{2})$
First stage,	Schroeder's,	1	$2\frac{1}{4}$	$\frac{3}{4}$
,,	Barbour & Webster's,	$\frac{3}{8}$	$2\frac{1}{4}$	$\frac{5}{8}$
,,	Winter's,	$\frac{3}{4}$	$2\frac{1}{8}$	$\frac{1}{2}$
,,	Barbour's,	$\frac{3}{4}$	$2\frac{3}{8}$	$\frac{3}{4}$
Second stage,	Braune's,	$1\frac{1}{8}$	2	$\frac{1}{2}$
,,	Chiari's,	$(\frac{1}{2})$	$(2\frac{3}{4})$	$(\frac{7}{8})$
,,	Barbour & Webster's,	$\frac{3}{4}$	$2\frac{1}{4}$	$\frac{1}{4}$

These facts are not in accordance with the theory of the pushing downwards and forwards of the pubic segment.

TABLE III.—*Changes in the Position of the Junction of the Urethra with the Bladder.*

Stage.	Whose Case.	Distance below Brim.	Distance behind Vertical Axis of Symphysis.
		In.	In.
Nullipara,	Average,	$2\frac{1}{4}$	$\frac{5}{8}$
Pregnancy, 8th mo.	Barbour & Webster's,	$2\frac{1}{2}$	$\frac{1}{2}$
,, 9th mo.	Braune's,	$2\frac{3}{4}$	$\frac{1}{4}$
,, 9th mo.	Waldeyer's,	$(2\frac{1}{2})$	(Some distance behind it)
First stage,	Schroeder's,	$2\frac{7}{8}$	$\frac{1}{2}$
,,	Barbour & Webster's,	$2\frac{1}{2}$	$\frac{5}{8}$
,,	Winter's,	$2\frac{3}{8}$	$\frac{5}{8}$
,,	Barbour's,	$2\frac{5}{8}$	$\frac{1}{4}$
Second stage,	Braune's,	$2\frac{1}{4}$	(Just about in line with)
,,	Chiari's,	$(1\frac{1}{2})$	$(\frac{3}{8})$
,,	Barbour & Webster's,	$1\frac{3}{4}$	$\frac{3}{8}$

This table shows that the lowest part of the bladder, viz., the point of entrance of the urethra, is, during pregnancy, lower in the pelvis; that during the early part of the first stage it is scarcely altered in position (being neither raised nor pushed forwards), but that during the second stage it is considerably elevated.

[1] Bladder partly distended.

TABLE IV.—*Thickness of Tissue between Lower Margin of Pubes and Vagina in Line with the Vertical Axis of the Pubes.*

Stage.	Whose Case.	Thickness of Tissue.
		In.
Nullipara,	Average,	$\frac{5}{8}$
Pregnancy, 8 mo.	Barbour & Webster's,	$1\frac{3}{8}$
„ 9 mo.	Braune's,	$1\frac{3}{4}$
„ 9 mo.	Waldeyer's,	$\frac{7}{8}$
First stage,	Schroeder's,	$1\frac{1}{2}$
„	Barbour & Webster's,	$1\frac{3}{8}$
„	Winter's,	$1\frac{1}{8}$
„	Barbour's,	$1\frac{1}{8}$
Second stage,	Braune's,	$\frac{1}{2}$
„	Chiari's,	...
„	Barbour & Webster's,	$\frac{5}{8}$

This table shows that the thickness of this tissue is increased during pregnancy; and that during labour it is not increased, as it certainly would be, were there a pushing downwards of the pubic segment.

TABLE V.—*Depth of the Utero-vesical Pouch of Peritoneum.*

Stage.	Whose Section.	Distance below Brim.
		In.
Nullipara,	Average,	$2\frac{1}{4}$
Pregnancy, 8th mo.	Barbour & Webster's,	$2\frac{3}{4}$
„ 9th mo.	Braune's,	$2\frac{3}{8}$
„ 9th mo.	Waldeyer's,	1 (abnormally high)
First stage,	Winter's,	$1\frac{5}{16}$
„ [1]	Barbour & Webster's,	$2\frac{1}{4}$
„	Schroeder's,	$1\frac{9}{16}$
„ [1]	Barbour's,	$2\frac{1}{8}$
Second stage,	Braune's,	Above brim
„	Chiari's,	„
„	Barbour & Webster's,	„

This table shows that the utero-vesical pouch is lower in pregnancy; that it is not made to descend when labour commences, but is, on the contrary, elevated, *i.e.*, stripped upwards from the bladder, and that from a very early stage of labour.

[1] In these a little must be deducted to allow for the sinking of the peritoneum after the abdomen was opened—very little, however, as it was fastened in position before freezing.

TABLE VI.—*The Position of the Os Externum and Os Internum.*

a. Os Externum.

Stage.	Whose Case.	Distance below Brim Anteriorly.	Distance below Brim Posteriorly.
		In.	In.
Nullipara,	Average,	$2\frac{1}{2}$	$2\frac{1}{2}$
Pregnancy, 8th mo.	Barbour & Webster's,	$3\frac{7}{16}$	$3\frac{7}{16}$
„ 9th mo.	Braune's,	$3\frac{5}{8}$	$3\frac{5}{8}$
„ 9th mo.	Waldeyer's,	$2\frac{3}{4}$	$2\frac{3}{4}$
First stage,	Schroeder's,	$3\frac{1}{2}$	$4\frac{1}{8}$
„	Barbour & Webster's,	$3\frac{1}{2}$	$3\frac{1}{2}$
„	Winter's,	$3\frac{1}{4}$	$3\frac{7}{16}$
„	Barbour's,	$3\frac{1}{2}$	$3\frac{1}{2}$
Second stage,	Braune's,	$1\frac{3}{4}$	$3\frac{3}{4}$
„	Chiari's,	1	$2\frac{1}{4}$
„	Barbour & Webster's,	$1\frac{1}{4}$	$1\frac{3}{4}$

b. Os Internum.

Stage.	Whose Case.	Distance below Brim Anteriorly.	Distance below Brim Posteriorly.
		In.	In.
Nullipara,	Average,	$2\frac{1}{4}$	$2\frac{1}{4}$
Pregnancy, 8th mo.	Barbour & Webster's,	$2\frac{3}{4}$	$2\frac{3}{4}$
„ 9th mo.	Braune's,	$2\frac{3}{8}$	$2\frac{3}{8}$
„ 9th mo.	Waldeyer's,	Abnormally high	...
First stage,	Winter's,	$2\frac{3}{4}$	3
„	Barbour & Webster's,	$2\frac{5}{8}$	$2\frac{2}{3}$
„	Schroeder's,	$3\frac{1}{2}$	4

These tables show that during pregnancy the whole cervix is at a lower level than in the non-pregnant condition; that during the first stage, although the cervix is thinned and taken up (well marked in Schroeder's section), so that the os internum is moved farther away from the os externum, it is really at a lower level than before labour began. This is chiefly true of the posterior wall, where the taking-up is most marked; the tables show it to be on a considerably lower level. The anterior wall is only slightly depressed in its upper part, due to the pressure of the uterine contents on its softened structure. The lower level occupied by the posterior wall is due to the same cause plus greater thinning-out of it as well as of the posterior lower uterine segment.

The tables also show that during the second stage the os externum is higher in position. It is impossible to trace the os

internum during the second stage, as its position has not been determined in the sections.

It is to be noticed that the cases of labour which I have included in these tables are those in which the full time had been reached, and in which the head or breech presented. In Waldeyer's full time and in Barbour and Webster's eight-month pregnancy cases only did the breech present, but there is no reason to suppose that the measurements would differ to any extent from similar cases with the head presenting.

Sæxinger's case of labour at the end of the eighth month I have not included, although in such a case it is most probable that the conditions are similar to those in a full time labour. An examination of his vertical mesial section gives us the following facts, viz.:—

1. The pelvic-floor projection is only $2\frac{1}{8}$ in., while the skin distance from the coccyx to the lower margin of the symphysis is $6\frac{1}{2}$ in.

2. The urethral orifice is at a higher level than in any of the other first stage cases, being about the same distance in front of the vertical axis of the pubes, and only $\frac{1}{4}$ in. below the symphysis.

3. The point of junction of urethra and bladder is higher than in any of the other first stage cases, and nearer the pubes than in the majority of them.

4. There is less thickness of tissue between the lower margin of the symphysis and the vagina than in any of the others.

5. The utero-vesical pouch is much higher, being, indeed, above the brim.

6. The os externum is higher.

These facts greatly strengthen the deductions already made, as well as others to be presently made, from the measurements of the full time labour cases given in my tables. We are now in possession of a sufficient number of cases to enable us to trace the movements of the pelvic floor during a considerable part of the first stage and through nearly the whole of the second stage. We have as yet no section of a late ninth month first stage, but its want will scarcely be felt in our study of this process, with the facts already possessed by us. It is evident that the beginning and continuation of labour would be accompanied with a pushing downwards of the pubic together with the sacral segment by the advancing child, were there no restraining force acting at the same time. We have seen that there is, however, no pushing down of the pubic segment during the first stage, because—

1. The urethral orifice is neither inferior nor anterior to the position occupied by it immediately before labour.

2. The junction of the urethra and bladder (a point certainly in the pubic segment) is not at a lower level.

3. The thickness of tissue between the lower margin of the pubes and the vagina is not increased, but is rather diminished.

4. The anterior cervical wall, as a whole, is not at a lower level.

There must, therefore, be from the very commencement of labour some force acting in opposition to that which tends to push down the pubic segment. This restraining force is undoubtedly, as Dr Berry Hart has pointed out, the upward traction exercised by the contracting uterus on the lower uterine segment and cervix through the attachment of the latter to the bladder and vagina by means of connective tissue. This upward traction is, however, from the first also counteracted by the thinning out of the lower uterine segment and cervix, so that it barely serves during the early part of the first stage to keep the pubic segment in its pre-parturient position. There are, as it were, three forces in operation, viz.:—

a. The upward traction of the uterus.

b. The downward pressure of the uterine contents.

c. The thinning out of the lower uterine segment and cervix (although it is scarcely exact to call this last a *force*).

For a time in the first stage these so oppose one another that the pubic segment is not moved at all. With the advance of this stage the upward traction of the uterus becomes stronger, and the pressure of its contents on the pubic segment weaker, as the sacral segment is more and more pushed on from above, and gradually actual elevation of the pubic segment begins. As we follow its movement during the second stage we find it still continues to be elevated, because the sections show:—

1. That the point of junction of the urethra and the bladder is higher in the pelvis and nearer the brim.

2. That the urethral orifice is higher in position.

3. That the thickness of tissue between the lower margin of the pubes and vagina is greatly diminished.

4. That the os externum is much higher in position.

Having thus established the fact that the pubic segment is elevated, we may now consider more minutely some details of the process. Though for a time in the early part of the first stage there is no actual elevation of the pubic segment on account of the antagonism between the forces acting upon it, we find taking place from the first an actual elevation of the utero-vesical pouch, caused by the stripping of the peritoneum from the posterior part of the upper surface of the bladder by means of the upward traction of the uterus.

If we compare Tables V. and VI. *b*., we find that whereas in pregnancy the os internum of the anterior wall and the bottom of the utero-vesical pouch are the same distance below the brim (in vertical mesial section), in the first stage sections the latter is at a higher level. This change must be accounted for by the fact that the thinning out and elongation of the lower uterine segment takes place chiefly immediately above the cervix.

When after a time the uterine traction becomes stronger, the cervix is gradually elevated, and with it that part of the bladder

(the posterior wall) which is attached to it. Then the upper and posterior walls of the bladder are made to slide upwards and forwards over the base. Then the base in its turn, together with the rest of the posterior part of the pubic segment, moves in the same direction, and afterwards the anterior part is elevated.

This process goes on until the bladder lies behind and partly above the pubes, its cavity being continuous below with the upper part of the urethra, and parallel to the posterior surface of the pubes, and also to the cervix which lies close behind it. The changes in the relation of the cervix and junction of urethra with bladder to one another and to the pubes are well brought out in the following table :—

TABLE VII.—*Changes in the Relation of the Junction of the Urethra with the Bladder (Base of Bladder), the Cervix, and the Pubes.*

Stage.	Whose Case.	Distance of Junction of Urethra with Bladder behind the Vertical Axis of the Symphysis.	Distance of Cervix from Axis of Pubes.
		In.	In.
Nullipara,	Average,	$\frac{5}{8}$	2
Pregnancy, 8th mo.	Barbour & Webster's,	$\frac{1}{2}$	$1\frac{5}{16}$
,, 9th mo.	Braune's,	$\frac{1}{4}$	$1\frac{3}{8}$
,, 9th mo.	Waldeyer's,	(Some distance behind it)	$\frac{3}{4}$
First stage,	Schroeder's,	$\frac{1}{2}$	1
,,	Barbour & Webster's,	$\frac{1}{2}$	$1\frac{7}{8}$
,,	Winter's,	$\frac{5}{8}$	$1\frac{3}{4}$
Second stage,	Braune's,[1]	(Just about in line with it)	$\frac{1}{2}$
,,	Chiari's,[1]	$(\frac{3}{8})$	$\frac{11}{16}$
,,	Barbour & Webster's,	$\frac{3}{8}$	$\frac{11}{16}$

Accompanying the uterine traction are two other conditions which help to force the pubic segment forwards against the bone, viz., the stiffening and passing forwards of the uterine wall during the pains and the compression by the head after it has descended through the dilated cervix into the pelvic cavity. At this stage, I believe, the head does push the pubic segment, but pushes it upwards and forwards, and this is due to the strong upward and forward resistance of the sacral segment against it.

The bladder is not at all drawn up into the abdomen to the degree hitherto supposed; the greatest part of it lies still in the pelvis. In Braune's second stage section its highest point is $\frac{3}{4}$ in. above the brim level, in Chiari's 1 in., and in Barbour and Webster's

[1] Although Braune and Chiari do not mark the upper limit of the urethra, we may almost exactly place it in their plates by measuring the length of the canal. We now know that the urethra is not elongated in labour.

$1\frac{3}{8}$ in. The position of the organ in the latter case was well determined; while it extended above the brim only for a short distance, it had a transverse breadth behind the pubes of nearly five inches.

In both Braune's and Chiari's cases the urethral opening of the bladder is lower than in Barbour and Webster's case. The explanation of these differences is to be found, most probably, in the unusual duration of the bag of membranes in the former two. The downward and forward pressure exerted by it resists somewhat the upward traction of the uterus by pushing the anterior part of the pubic segment against the pubes.

It seems to me, therefore, that, from the facts obtained by a careful study of all the sections hitherto published, we are justified in concluding beyond doubt—

1. That the pubic segment is not at all pushed downwards during labour.

2. That, on the contrary, it is elevated, and mainly by the upward traction of the uterus, as Dr Berry Hart first pointed out.

3. That this traction is at work from the very commencement of labour, but that owing to opposing forces it does not begin to raise the segment until the first stage has advanced for a certain period.

4. That in the second stage the upward and forward resistance of the sacral segment helps to push the pubic segment against the pubes through the medium of the child.

5. That the elevation of the pubic segment may be somewhat retarded by long persistence of the bag of membranes.

6. That the greater part of the bladder is not drawn up into the abdomen, but remains behind the pubes, only a small portion being above the brim.

7. That the urethra is not elongated during labour.

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Dr F. W. N. Haultain congratulated Dr Webster on the painstaking nature of his excellent paper, which contained in a condensed form a large number of most important facts. He, however, personally was much indebted to Dr Webster for the information on the precise situation of the neck and base of the bladder during the second stage of labour. They were evidently well below the brim of the pelvis 1⅝th of an inch, and were thus undoubtedly in a position to be compressed between the fœtal head and the bony pelvis. This point he had long wished to be certain of in respect of some investigations he was making on the arrest of the circulation of the bladder in labour, and he must therefore thank Dr Webster for having given him such precise information on the subject.

Dr Ballantyne congratulated Dr Webster on the excellent work he had done in bringing together evidence bearing upon the relation of the bladder in pregnancy and labour from so many reliable sources. He would offer one criticism, and that was that several of the specimens of which frozen sections had been made were abnormal (breech presentation, hand presentation, etc.), and that, therefore, results founded upon them could not safely be taken as representing what occurred in normal parturition. A sufficiently large number of approximately normal specimens from which to draw conclusions was still a desideratum. Dr Ballantyne was specially interested in the section of a case at the end of the second stage of labour, in which head moulding was shown in a very clear manner.

The President complimented Dr Webster on the very able appearance he had made in his first paper. The paper involved a very large amount of work, both careful measurement and accurate deduction. It completely established the results he (the President) had come to in 1880, and extended them in some points. The recent paper of Dr Symington, in which it was endeavoured to be shown that the pubic segment was so fixed that it could not be drawn up, but, strange to say, might be depressed, was thoroughly answered by Dr Webster, whom again he wished to congratulate on the ability distinguishing his maiden appearance before their Society.

Dr Webster thanked the Society for the kind reception given to his paper.

V. THE HEAD OF THE INFANT AT BIRTH.

By J. W. Ballantyne, M.D., F.R.C.P.E., Buchanan Scholar, 1883 ; Simpson-Gunning Prizeman, 1889 ; Assistant to the Professor of Midwifery in the University of Edinburgh ; Physician for Diseases of Children, Cowgate Dispensary, Edinburgh.

Part I.

From the point of view of the obstetrician, the most important part of the infant's body is the head. The great importance of this region of the child's body is due, in the first place, to the circumstance that in the great majority of confinements (95 per cent.) the child comes through the maternal passages head first; in the second place, for the reason that the head is the largest and most solid part of the body of the infant; and in the third place, from the fact that any abnormality in the size, form, position, or ossification of the head will immediately introduce the elements of delay and danger into the process of parturition. It is not, therefore, surprising that much has been written concerning the head of the infant, and the question may reasonably be asked whether there yet remains anything new to be said on the subject. I hope to be able to show in the following communication that there are still some questions with regard to the anatomy of the infant's head which may profitably be investigated by the obstetrician and by the anatomist.

The head consists of two parts, which differ from one another in size and in obstetric importance. These parts are the cranium and the face. In the infant the cranium is relatively much larger than the face, and this disproportion is due to the small degree of development of the latter region. The relatively small size of the face is very evident when the head is seen in sagittal section. The face also is of less importance to the obstetrician than is the cranium; for whilst the most common presentation is that of the cranial vertex, one of the rarest presentations is that of the face. The consideration of the cranium will, therefore, be taken first; and it will be necessary here briefly to recapitulate, for the sake of completeness, certain anatomical details concerning the cranium which are well known.

The cranium is made up of eight bones, two pairs and four single, which are in the infant loosely held together by membrane, and which are capable of a large amount of displacement upon each other. The cranium is clearly divided into two parts—the vault and the base. The vault is constituted by the two halves of the frontal bone, by the two parietal bones, and by that portion of the occipital bone which lies above the foramen magnum; at the sides also the squamous part of each temporal bone completes the framework of this part of the head. The base of the cranium is composed of the basi-occiput of the sphenoid, the ethmoid, and of

the petrous part of the temporal bones. The bones which make up the vault differ from those that form the base, in being thinner and more loosely joined together; thus when pressure is brought to bear upon the vault the bones are displaced, and a change in the form of the head is the result; on the other hand, pressure does not affect to any appreciable degree the base of the cranium. In this anatomical fact is found the rationale of operations, such as basilysis, which not only diminish the size of the compressible vault, but also that of the incompressible base.

The bones of the cranium are joined together by sutures; and those which lie within the sphere of touch during labour are the sagittal, the frontal, the coronal, and the lambdoidal. To the obstetrician the sagittal suture is a most important landmark. This suture connects together the upper margins of the two parietal bones, and derives its name from its resemblance to an arrow (sagitta); but it must be borne in mind that the resemblance to an arrow is manifest only when the anterior fontanelle is considered as the head of the arrow. It is a matter of regret that all writers do not adopt the same definition of the sagittal suture. It is usually defined as terminating in front of the anterior fontanelle, and behind at the posterior fontanelle; but some authors include the fontanelles, and others, as Tarnier and Chantreuil (vol. i. p. 411), consider the frontal suture as forming the anterior portion of the sagittal, for they state that "la suture sagittale, grande suture, ou suture antéro-postérieure, s'étend de la racine du nez à l'angle supérieur de l'occipital." It is better, however, to define this suture, as does the majority of writers, as that which exists between the upper margins of the parietal bones and which is bounded in front by the coronal and behind by the lambdoidal suture. At the commencement of labour, when the vertex presents, the sagittal suture is found lying in one or other of the two diagonal diameters of the true pelvis, and the movement of internal rotation brings this suture into the antero-posterior diameter of the pelvis. The frontal, coronal, and lambdoidal sutures call for no special notice here. It is thus seen that in the head of the infant the bones of the vault are not immovably fixed to each other, as they are in the adult, but are loosely attached by a membrane composed of periosteum and dura mater, and can be moved to some extent upon one another. This constitutes one of the factors in head-moulding during labour.

The presence of fontanelles, or "openings in the head," is one of the most important characters of the infant's cranium. These membranous spaces are six in number, two being placed in the middle line of the vault, and four being situated laterally. Their general characters are well known, but it is not so generally recognised that their size varies considerably even in normal heads. I have measured the anterior fontanelle in a large number of cases, and have found its average length to be 2·7 ctms., and its

average transverse diameter to be 2 ctms. In one case, where the ossification of the head was well advanced, both the antero-posterior diameter and the transverse measured 1·5 ctms.; whilst in a case where the bones of the head were widely separated, without there being any hydrocephalus, the anterior fontanelle measured 3 ctms. both antero-posteriorly and transversely. The variation in size of the anterior fontanelle must influence, to a very considerable extent, the degree of head moulding. With regard to the posterior or occipital fontanelle, it should be noted that if the ossification of the head be at all far advanced, there is at this spot no distinct membranous space, the tip of the supra-occiput fitting in between the parietal bones. In many cases, however, there exists a space which is then triangular in shape, and is always much smaller than the anterior fontanelle. I have found the average antero-posterior measurement of the fontanelle to be 8 mms., whilst the base of the triangular space had a length of from 7 mms. to 1 ctm. In one or two cases I have seen the space entirely filled up by a Wormian bone of triangular form. The posterior fontanelle supplies an important landmark in the study and description of the mechanism of normal labour; for it is always within the reach of the examiner's finger, and its relation to the girdle of contact of the soft parts can always be ascertained during labour. Thus the so-called movement of flexion may be defined and described as that movement by which the posterior fontanelle leaves the side of the area within the girdle of contact of the canals, and comes to lie nearer to the centre of that area. This is to be preferred to any definition founded upon the relation of the chin of the infant to the sternum, for these parts are out of the reach of the fingers of the obstetrician, and we are not warranted in basing definitions upon their relations. In the same way internal rotation may be defined as a movement which brings the posterior fontanelle and sagittal suture from a diagonal diameter of the area within the girdle of contact into the antero-posterior diameter of that area, the fontanelle lying anteriorly. The relations of the girdle of contact of the soft parts and the area of the head within it can always be felt, and if it were necessary seen, by the accoucheur. It is more easy to feel the posterior fontanelle moving from the side of the area within the girdle to its centre than to note its dipping or descent.

The four lateral fontanelles, although not of great clinical significance, are not to be neglected as factors in head moulding. I have frequently found the antero-lateral fontanelles to measure 1 ctm. antero-posteriorly, whilst the postero-lateral fontanelles may measure nearly as much. Supplementary fontanelles may exist in the cranium of the infant in various positions. I have noted them several times in connexion with the sagittal suture, and they may also lie near to the sutures, or, more rarely, they may be found at different points in the bones at a distance from any suture.

In connexion with the sutures and fontanelles of the infant's head, may be considered the fibro-cartilaginous hinge of the occiput. Budin, in his work upon the head of the infant (*De la tête du fœtus au point de vue de l'obstétrique*, 1876), lays special stress upon the existence of this hinge ("charnière cartilagineuse et fibreuse"), and points out its special importance as a factor in head moulding. It is formed by a band of tissue partly cartilaginous, partly fibrous, which extends from the posterior end of the foramen magnum outwards on each side to the postero-lateral fontanelle. Budin points out that near the middle line it is composed of cartilage, that, namely, which intervenes between the supra-occiput and the posterior border of the ex-occipital; more externally fibrous tissue intervenes between these two bones; and further out still there is another piece of cartilage at the point where the occipital bone comes into contact with the temporal and parietal of the same side. According to this observer, the inner cartilaginous plate measures from 5 to 6 mms. antero-posteriorly and 10 mms. transversely, whilst the fibrous portion of the hinge measures 9 mms. antero-posteriorly, and 10 mms. transversely. I have examined several infants' skulls, and have found that rarely does this hinge exist in the condition described by Budin. Most frequently I have found the inner plate of cartilage ossified more or less completely, whilst the fibrous portion does not measure so much antero-posteriorly as Budin states. In infants, however, which have not reached the full term of nine months, the hinge exists in its entire extent. It has been stated that if the occipital bone, or rather that part of it which lies behind this hinge, be separated from its attachments along the line of the lambdoidal suture, it can then be flexed and extended upon this hinge to a great degree. In dried skulls I have found that a small amount of movement of the occiput backwards and forwards is thus rendered possible; but even in fresh heads I have not been able to make the occiput execute the extensive movements which have been described. In seven months' infants I found the range of movement to be much greater. Still, the amount of movement thus permitted even in the full-time child will be sufficient to explain the depression of the occipital bone under the parietals which is found after prolonged labours. The existence of this hinge also serves to explain the large amount of antero-posterior shortening of the fœtal head, which Dr Milne Murray found he was able to obtain by applying considerable pressure to the frontal and occipital bones (*Edin. Obstet. Trans.*, vol. xiii. p. 206). At the same time, it must be borne in mind that the parietal bones are raised, and that in addition to the depression of the occiput there is this rising of the parietal bones, with consequent increase in the vertical diameters of the cranium. This cartilaginous hinge, it may be pointed out, has an interest also when looked at from the developmental standpoint, for it marks posteriorly the line which

separates the bones of the cranial vault from those of the base. The bones of the vault are developed from the membranous capsules surrounding the encephalon, which in its turn is derived from the second ring of the protovertebral mass; whilst the bones of the base are developed from the first ring of this protovertebral mass, and pass through an intermediate cartilaginous stage before becoming ossified. The supra-occiput is thus divided developmentally from the basilar and ex-occipital portions of the bone.

The vault of the cranium has been, for descriptive purposes, divided into several regions; but some difference of opinion has long existed as to the exact signification of the terms used by obstetric writers to designate these regions. The regions are the sinciput, the occiput, and the vertex. The subject of the nomenclature of the cranial regions was one of the questions considered by the Uniformity in Obstetrical Nomenclature Committee at the International Medical Congress in Washington in 1887. It is to be regretted that the definitions then agreed upon have not been more generally adopted in the various text-books on midwifery published during the last three years; for we find that even in the *American System of Obstetrics*, published in 1888, the term vertex is held to be synonymous with the posterior fontanelle and the small area around it. The following are the definitions recommended by the committee for the regions of the cranial vault:—

Occiput—the portion of the head lying behind the posterior fontanelle.

Sinciput—the portion of the head lying in front of the bregma or anterior fontanelle.

Vertex—the portion of the head lying between the fontanelles and extending laterally to the parietal protuberances.

It will be observed that the vertex thus defined is a region and not a point, and whilst this definition is the most useful clinically, it would have been more strictly accurate to have defined the vertex as the point at which a line joining the two parietal eminences crosses the sagittal suture.

It will be noted that all the landmarks of the cranium which are of practical interest to the obstetrician are grouped either in or immediately around the vertex. The sutures, the fontanelles, and the parietal and occipital eminences, constitute the important landmarks of the head of the infant.

The form of the head of the infant now may be considered. The normal size and form of the head before the commencement of labour is not yet clearly ascertained. This is due to the fact that from the passage of the head through the pelvis changes occur in its form, and these changes have not yet been fully worked out; hence, until the details of the measurements of heads of infants which have been removed by the Cæsarean section have been noted in a large number of cases, the exact form of the infant's head immediately before labour sets in cannot be definitely stated.

Further, needless confusion and difficulty have been introduced into the study of this subject from the fact that different observers have taken different points on the head as their landmarks in measuring the various diameters. The latter difficulty may now be overcome by the universal adoption by obstetric writers of the definitions of the various diameters laid down at the Washington Congress. These definitions have been adopted in the present communication, and it may be well briefly to restate them at this point. There are three antero-posterior diameters:—

(*a.*) From the tip of the occipital bone to the lower margin of the chin = diameter occipito-mentalis, O.M.

(*b.*) From the occipital protuberance to the root of the nose = diameter occipito-frontalis, O.F.

(*c.*) From the point of union of the neck and the occiput to the centre of the anterior fontanelle = diameter sub-occipital bregmatica, s.O.B.

The definitions of the occipito-mental and occipito-frontal diameters given above agree with those found in the majority of text-books; but with regard to the suboccipito-bregmatic diameter, some writers have placed its anterior starting-point at the posterior end of the bregma, others at the anterior end of the bregma, and still others at its centre. The definition as given by these last authors is, as will be seen, the one adopted by the congress. In addition to the three diameters above mentioned, Budin describes a fourth antero-posterior diameter, which he terms the supra-occipito-mental or maximum diameter. According to this observer the occipito-mental diameter, although generally supposed to be the longest, is not really so, and this observation is perfectly correct if the definition of the occipito-mental as given by the congress is accepted. Budin states that the maximum antero-posterior diameter is one which extends from the chin to the sagittal suture, terminating at a point in the suture which lies between the tip of the occiput and the anterior fontanelle, and varies in different cases. This observation I have confirmed in many instances. Thus, in one case the O.M. measured 10·5 ctms., whilst the maximum measured 11 ctms.; and in this instance the starting-point of the maximum diameter posteriorly lay nearly midway between the posterior fontanelle and the posterior end of the anterior fontanelle. In another case the O.M. measured 12·5 ctms., and the maximum measured 14·5 ctms.; whilst even in the normal or antepartum head the maximum diameter exceeds the occipito-mental by from 5 mms. to 1 ctm. The maximum diameter of Budin, which it may be noted corresponds to the occipito-mental as defined by Schroeder, is important as being the longest diameter of the head, and the only diameter which is always increased during the progress of the head through the pelvis in normal labour.

With regard to the transverse diameters of the head, comparatively little confusion exists. Two are usually defined:—

(*a.*) Between the two parietal protuberances = diameter Bi-Parietalis, Bi-P.

(*b.*) Between the two lower extremities of the coronal suture = diameter bi-temporalis, Bi-T.

A bi-mastoid diameter is sometimes measured.

The vertical diameters of the head are somewhat vaguely defined, thus the fronto-mental passes from the highest point of the forehead to the chin, and the cervico- or laryngo-bregmatic passes from the middle of the anterior fontanelle to the upper and anterior part of the neck in the neighbourhood of the larynx.

In relation to each antero-posterior diameter of the head there is a corresponding circumference, and the circumference corresponding to the maximum diameter is the greatest, whilst that corresponding to the suboccipito-bregmatic diameter is the minimum circumference.

The diameter of the head being clearly defined, we are in a position to study the form of the head—first, before labour; secondly, during labour; thirdly, immediately after labour; and, fourthly, five or six days after parturition. It is impossible that such terms as ovoid, wedge-shaped, and the like, can convey an adequate idea of the form of the head, and it is necessary that the form be expressed in the terms of the three measurements represented by the antero-posterior, transverse, and vertical diameters.

Form of the Head before Birth—the Normal Head.—Budin points out that what are called in the text-books the normal measurements of the infant's head are not truly normal, for the form of the head has been modified by the pressure to which it has been subjected during its passage through the pelvis. This statement is true not only in cases of head presentation, but also in those in which the pelvic extremity of the infant comes first, and in those labours which from the large size of the mother's pelvis, or the small size of the child's head, are very rapidly accomplished. How, then, is the normal form and size of the infant's head at term to be ascertained? Budin employs two methods—first, the measurement of the heads of children which have been removed by the Cæsarean section before labour sets in; and, secondly, the measurement of the heads of children five or six days old, at the time when, as Budin believes, the effects of labour will have passed off. To the information obtained from these two sources, we can now add that obtained from the measurement of the head of the infant in utero in cases where frozen sections have been made of the mother's body, when death has occurred before labour has set in. In a case reported by Budin, the mother died of pulmonary hæmorrhage, and the child was removed by Cæsarean section. Labour had not commenced. The following were the measurements of the head of the infant:—Maximum = 12·9 ctms.; O.M. = 12·4 ctms.; O.F. = 11·8 ctms.; s.O.B. = 10·3 ctms.; Bi-P. = 10 ctms.; Bi-T. = 8·7 ctms. The maximum circumference was 37·6

ctms., and the minimum 33·5 ctms. The total length of the child was 51 ctms. I have not had the opportunity of measuring the head of a full-time child removed by Cæsarean section; but in a case where the mother died of pneumonia between the seventh and eighth months of her pregnancy, I was able to measure the infant's head. Labour had not commenced in this case, and the measurements were—maximum = 10·5 ctms.; O.M. = 10 ctms.; O.F. = 8·9 ctms.; s.O.B. = 7·5 ctms.; Bi-P. = 5·9 ctms.; Bi-T. = 5·1 ctms. The total length of the child was 30 ctms. In one of Freeland Barbour's cases, where frozen sections were made of the pregnant woman, the measurements of the head in utero were—O.M. = 12·7 ctms.; O.F. = 10·4 ctms.; s.O.B. = 10·8 ctms. In this case the patient died before labour set in, but the head of the child was in the pelvic cavity. In addition to these three cases where measurements were made of the head unmoulded by labour, there may be mentioned one out of many cases in which the head was measured six days after the confinement. The measurements in this case were as follows—maximum = 13 ctms.; O.M. = 12·5 ctms.; O.F. = 11·3 ctms.; s.O.B. = 10 ctms.; Bi-P. = 9·7 ctms.; Bi-T. = 8·3 ctms. The circumference in the O.M. plane was 35·5 ctms., and in the s.O.B. plane 29·2 ctms. The total length of the child was 48·1 ctms. In one case in which labour was precipitate the measurements of the head very closely resembled those given above. From a study of the figures thus obtained, an idea of the normal form and size of the head before the onset of labour may be obtained. The measurements may be placed in tabular form for the sake of comparison:—

	Budin's Case, full-time Infant, Cæsarean Section.	Barbour's Case, full-time Infant, in Frozen Section.	Ballantyne's Case, 7½ months' Infant, removed post-mortem.	Ballantyne's Case, 6 days' old Infant.
Max.	12·9 ctms.		10·5 ctms.	13·0 ctms.
O.M.	12·4 „	12·7 ctms.	10·0 „	12·5 „
O.F.	11·8 „	10·4 „	8·9 „	11·5 „
s.O.B.	10·3 „	10·8 „	7·5 „	10·3 „
Bi-P.	10·0 „		5·9 „	9·7 „
Bi-T.	8·7 „		5·1 „	8·3 „

A glance at the accompanying drawings (Figs. 1, 2, and 6) will give an idea of how closely the head in Budin's case resembles the heads in my two cases, both as regards form, and as regards relative length of the diameters. The maximum diameter in Budin's case was 5 mms. longer than the O.M., 1·1 ctms. longer than the O.F., and 2·6 ctms. longer than the s.O.B.; in the case of the seven and a half months' fœtus, whose head I measured, the maximum exceeded the O.M. by 5 mms., the O.F. by 1·6 ctms., and the s.O.B. by 3 ctms.; and in the case of the full-time infant, six days old, the maximum exceeded the O.M. by 5 mms., the O.F.

by 1·7 ctms., and the s.O.B. by 3 ctms. In regard to the transverse diameters, the Bi-P., in Budin's case (Fig. 4), exceeded the Bi-T. by 1·3 ctms.; in the seven and a half months' infant the Bi-P. measured 8 mms. more than the Bi-T.; whilst in the six days old infant the Bi-P. measured 1·4 ctms. more than the Bi-T. In the case of the seven and a half months' infant it will be observed that both the absolute and relative lengths of the two transverse diameters differ considerably from those seen in the full-time child; but this difference is to be accounted for by the relatively small development of the head of the fœtus in a transverse direction, along with the small size of the parietal eminences. From Budin's researches and those of Labat (*La tête du fœtus au point du vue obstétrical*, Labat, 1881), it is probable that, in the normal unmoulded head, the bi-parietal diameter is a little more than 1 ctm. greater than the bi-temporal diameter. Whilst we may regard the head, in the three cases given above, as showing the normal unmoulded form, we may also provisionally state that the diameters of the normal head of an infant of from 48 to 51 ctms. (19 to 20 inches) in length are as follows:—

Maximum,	13	ctms.	$5\frac{1}{8}$	inches.	
Occipito-Mental,	12·5	„	$4\frac{7}{8}$	„	(nearly 5 inches).
Occipito-Frontal,	11·5	„	$4\frac{1}{2}$	„	
Sub-Occipito-Bregmatic,	10·3	„	$4\frac{1}{16}$	„	(about 4 inches).
Bi-Parietal,	10·0	„	$3\frac{15}{16}$	„	(about 4 inches).
Bi-Temporal,	8·7	„	$3\frac{7}{16}$	„	(about $3\frac{1}{2}$ inches).

In Barbour's case it is to be noted that whilst the occipito-mental agrees closely with that diameter in the other cases, the occipito-frontal is less, and the sub-occipito-bregmatic greater than in the other cases.

Form of the Head during Labour—The Moulding Head.

It is well known that the head becomes moulded during its passage through the pelvis. This moulding is, in the first place, due to the fact that the expulsive powers are propelling the head through canals or passages which offer considerable resistance even in normal cases, but it is also due to certain inherent characteristics of the head, for there exist in the head certain sutures and fontanelles which permit the bones to glide one upon the other; there is, secondly, incomplete ossification of the bones themselves; and there is, thirdly, the presence of the cartilaginous hinge of the occiput. Our ideas of the form of the head and of the length of its diameters during labour have hitherto been derived from an examination of the head immediately after labour, and from clinical examination by touch during the progress. From these two methods, which are neither of them free from fallacy (for the immediate elastic recoil of the head after its expulsion from the canals must be considerable, and the obstetrician's conclusions

derived from the sense of touch may not be accurate)—from these two methods it has been affirmed, that during labour the frontal bone is somewhat depressed under the margins of the parietal bones, the tip of the occiput is also depressed below the parietals, and the parietal bone, which lies anteriorly in the pelvis, slightly overrides that which lies next the sacrum. In a recent contribution (*Reports of Laboratory of Royal College of Physicians, Edinburgh*, vol. ii.) Barbour and Webster give a drawing of a very interesting frozen section of a woman who died at the end of the second stage of labour, and in this section the vertical elongation and lateral deformity of the moulding infant's head are well displayed.

The measurements of the head in this case were as follows:—

Maximum,	16	ctms.	6	inches	(approx.)
Occipito-Mental,	13	„	5	„	„
Occipito-Frontal,	10	„	4	„	„
Sub-Occipito-Bregmatic,	10·8	„	4¼	„	„
Bi-Parietal,	8·8	„	3½	„	„
Bi-Temporal,	8·7	„	3½	„	„

Form of the Head immediately after Labour.—Countless observations have been made upon the form and diameters of the infant's head immediately after labour. The moulding which has occurred during labour is present, but, no doubt, in a less marked degree, after parturition is completed. If the diameters be compared with those of the normal unmoulded head, it is seen that the O.M., the O.F., and the s.O.B. are diminished whilst the maximum diameter is increased. In one of Budin's cases in which the head lay in the O.L.A. position, the measurements were—Max. = 13·9 ctms.; O.M. = 11·8 ctms.; O.F. = 11 ctms.; and the s.O.B. = 8·6 ctms. The average measurements which I have found so closely agree with those as to be practically identical. There is, therefore, a compression of the head in the sub-occipito-bregmatic plane, and a compensatory enlargement in the plane of the maximum diameter. In addition, there is present in many cases what is known as the parietal deformity. This transverse deformity has been specially studied by Fankhauser (*Die Schadelform nach Hinterhauptslage*, Bern, 1872), Labat, and others. The parietal bone which lies posteriorly *quâ* the pelvis, the left parietal therefore, in O.L.A. cases, is depressed at the sagittal suture below the contiguous margin of its fellow. In other words, the bone which lies anteriorly is at a lower level *quâ* the pelvis than that which is in relation with the posterior wall of the pelvis. Further, the parietal eminence, which lies anteriorly, is carried backwards *quâ* the head, and the whole of this side of the head is flattened. Barbour's specimen, to which reference has already been made, shows that this parietal deformity is produced during labour, and that it may be unaccompanied by any overlapping of the parietal bones. The cause of its production is probably to be

found in the existence of a triangular deficiency in the anterior pelvic wall, and in the presence of firm resisting structures posteriorly.

In occipito-dextra-posterior cases the moulding of the head and consequent change in form is more marked than in occipito-læva-anterior cases, and this is more especially the case in the labours where the head has not rotated well. In one case in which I made frozen sections of the infant, the peculiar moulding of the head is well seen (Fig. 5). The tip of the occiput is depressed below the margins of the parietal bones at the posterior fontanelle, and there is also great parietal distortion, for the right parietal bone, which lay posteriorly *quâ* the pelvis, is depressed below that which lay anteriorly, and the sagittal suture is displaced to the left of the middle line of the infant's body. In one of Budin's cases the head lay in the O.D.P. position, and the following were the head measurements as compared with those in my own case:—

	Budin's Case.	My own.
Maximum,	15·6 ctms.	14·5 ctms.
O.M. diameter,	13·9 „	12·8 „
O.F. „	10·8 „	11·5 „
s.O.B. „	9·4 „	10·2 „

The figures show that in Budin's case the elongation of the maximum diameter and the shortening of the O.F. and s.O.B. diameters have been greater than in my case, and this fact is also shown in the drawings (Figs. 5 and 6).

Budin, in his work already quoted, gives drawings and measurements of the head in pelvic cases, in face cases, and in others; but I have had no opportunity of studying the heads from such cases, either in the living infant or by means of frozen sections, and shall therefore omit any reference to them.

Form of the Head a few Days after Labour.—From elaborate statistics, Budin shows that during the days that follow birth, all the diameters of the head increase with the exception of the maximum diameter, which diminishes in length. After the first week of life, however, the maximum diameter also begins to increase in length. The increase in the diameters is due to the enlargement of the sutures and fontanelles, which in turn is due to the fact that the bones of the cranial vault no longer override one another, but lie in the same plane. In a typical case (Fig. 6) I found the head diameters at birth and six days afterwards to be as follow:—

	At Birth.	Six Days after Birth.
Maximum,	13·5 ctms.	13·0 ctms.
O.M.	12·3 „	12·5 „
O.F.	10·4 „	11·3 „
s.O.B.	8·3 „	10·3 „
Bi-P.	8·0 „	9·7 „
Bi-T.	7·0 „	8·3 „

From the above table it will be seen that there is six days after birth a great increase, varying from 1 ctm. to nearly 2 ctms. in the length of the occipito-frontal, sub-occipito-bregmatic, bi-parietal, and bi-temporal diameters. The occipito-mental shows a trifling increase, whilst the maximum shows a decrease of 5 mms. There is, therefore, six days after labour, a return to the conditions of the head which existed before labour began, with the exception that the sub-occipito-bregmatic diameter does not quite regain its former length.

Such are the changes which occur in the form and diameters of the infant's head during and after birth; there remains for consideration the wedge-shape of the head.

The head at birth has nearly always a wedge-shape as viewed from behind, from above, and from the side; but the wedge-shape, as seen from the side, is very important, as upon its existence depends, to a great extent, Lahs' theory of flexion (*Die Theorie der Geburt*, Lahs, 1877; *Head Flexion in Labour*, A. R. Simpson, 1879). Lahs pointed out that the head, as viewed from the side, has an asymmetrical wedge-shape, the occipital end of the wedge being steeper, and the anterior, or sincipital end, being more gently sloping, and upon this fact he founded his theory of the causation of head flexion in labour. The theory is now well known, and may be briefly stated as follows:—"That end of the cephalic ovoid will be guided foremost, the tangent of whose surface in the girdle of contact meets the perpendicular of that zone at the smallest angle." A reference to the drawings of the unmoulded head will show that the asymmetrical wedge-shape does exist before labour begins, whilst Braune's plate showing the head at the beginning of the second stage of labour, and Barbour's recent plate, showing the head nearly at the end of the second stage, demonstrate that the wedge-shape is greatly increased during labour. Again, drawings of the head made immediately after labour show the marked wedge-shape which, however, lessens in a few days, the head resuming very nearly its unmoulded form. It would seem, therefore, that the head has a primitive wedge-shape, and whilst this may be, and in all probability is, at least one factor in the causation of flexion, it is also evident that flexion increases and emphasizes the wedge-shape as labour goes on. The formation of the caput succedaneum still further increases the wedge-shape of the head. It seems clear also that the wedge-shape of the normal head is closely related to the primitive conical shape of the bones of the cranial vault. Cleland, in his *Memoir on the Form of the Human Skull*, points out the fact that, before birth, the two halves of the frontal bone, the two parietal bones, and the supra-occiput, "each present a prominent eminence from which the bone radiates in nearly straight lines." After birth a rounding of these eminences occurs. "Each roof bone is at first conical, and afterwards more nearly approaches a spherical curve." Any deviation from the normal form of the

roof bones will, therefore, interfere with the mechanism of labour, if Lahs' explanation be the true one, and this may be an additional reason why premature ossification of the head causes so much difficulty in labour.

Proportionate Size of Vault and Base of Cranium.—In a recent memoir ("Form of the Human Skull," Cleland, *Memoirs and Memoranda of Anatomy*, vol. i. pp. 13–26, 1889) Cleland makes the following statement:—"The arch elongates more rapidly than the base in fœtal life, until at birth, or soon afterwards, the arch, as measured from the root of the nose round to the back of the foramen magnum, has reached its highest proportionate length, as compared with a straight line uniting the same points, namely, —a proportion slightly exceeding 3 to 1." I have measured the cranial vault and base in a number of full-time children, and have obtained the following results:—

	Vault.	Base.
Case	I. 22·2 ctms.	8·0 ctms.
„	II. 23·0 „	8·0 „
„	III. 24·5 „	7·5 „
„	IV. 26·0 „	8·5 „
„	V. 21·0 „	7·5 „
„	VI. 23·0 „	8·4 „
„	VII. 19·0 „	6·0 „
„	VIII. 23·0 „	7·5 „
„	IX. 20·5 „	6·8 „
„	X. 21·0 „	8·0 „

These measurements were made upon full-time children with no obvious deformity of the cranium, and the result is that the vault was on an average nearly three times the length of the base. The exact proportion was 2·93 times, or 223·2 ctms. to 76·2 ctms. in the ten cases. I also measured the vault and base in fœtal skulls, in cases where labour had expelled the fœtus before the seventh month, with the following results:—

	Vault.	Base.
Case	I. 17·0 ctms.	5·5 ctms.
„	II. 17·5 „	5·7 „
„	III. 9·5 „	3·0 „

The vault in these cases was therefore almost exactly three times the length of the base, for on taking the average the relation is seen to be as 3·09 to 1 (vaults 44·0 ctms., bases 14·2 ctms.) In two children I ascertained the relation of vault to base; thus, in the case of a child of six the vault measured 34 ctms. and the base 12 ctms., whilst in a child of thirteen years of age the proportion was 38 ctms. to 13 ctms. In these cases the vault was 2·88 times longer than the base. In the adult Cleland finds that in

Scotch skulls the proportion is as 2·72 to 1. It will be seen that with regard to the measurement of the arch and its relation to that of the base at birth, the figures in my cases do not quite give the relative proportion of a little over 3 to 1 which Cleland finds to be the rule. The probability is that Cleland measured heads of children a few days old, in which the compressing effects of labour had passed off, whilst I measured the skulls of still-born children at the time when the bones were overlapping. Cleland, in the case of five skulls of new-born children, finds the proportion of arch to base to be 3·06 to 1; my measurements made upon ten skulls gave a proportion of 2·93 to 1. It is not, therefore, altogether certain that the arch bears a greater proportion to the base at the time of birth than at any time either before or after birth; it is most probable that during the last three months of intra-uterine life and the first ten years of extra-uterine the arch of the cranium bears to the base the proportion of 3 (or nearly 3) to 1. After ten years of age the proportion sinks to 2·7 or 2·8 to 1.

The Orbito-Nasal Angle.—Cleland, in his paper read before the Royal Society (*Philosophical Transactions of the Royal Society*, vol. clx. pp. 117–174), gives measurements of the orbito-nasal angle in the fœtus, in the infant at the time of birth, in children, and in adults. He states that "in infants at birth it has attained a greater size than it has either before or afterwards, but as childhood advances it becomes rather smaller than the adult average." The angle is that at which the front of the upper jaw lies in relation to the floor of the anterior fossa of the cranium. It is measured by drawing a line from the optic foramen to the fronto-nasal suture, and another from the suture to the tip of the nasal spine of the maxilla; the contained angle is the orbito-nasal. In a recent contribution to the subject Cleland draws the line to the *base* of the nasal spine; but I have, in my observations, drawn it to the tip in order to compare the results with those which Cleland has published. The method I employed was as follows: A thin strip of Britannia metal was taken, one end of which was placed in the optic foramen. The metal was then bent downwards at the level of the fronto-nasal suture until its lower end came in line with the tip of the nasal spine. The angle thus obtained was traced upon paper. The sides were then produced, and the angle formed was read off by means of a protractor. In fœtal skulls (from four to eight months) Cleland found the average angle to be one of 88°. This average he arrived at from the measurement of six skulls. I have only been able to measure three skulls.

	Age.	Orbito-nasal angle.
Case I.	5 months.	80°.
„ II.	5 „	77°.
„ III.	6 „	88°.

The average which was obtained was 81°·6, an average smaller

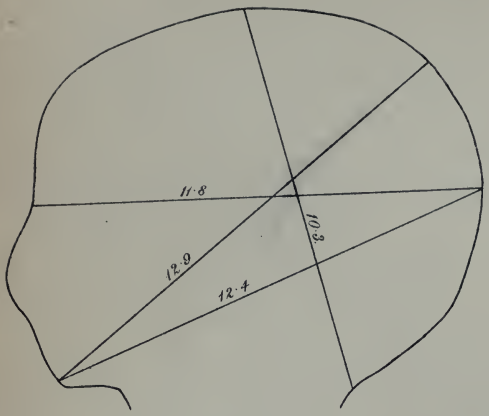

Fig. 1.

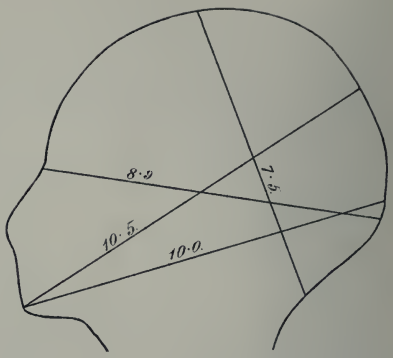

Fig. 2.

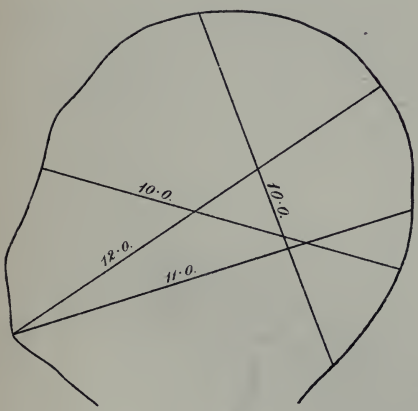

Fig. 3.

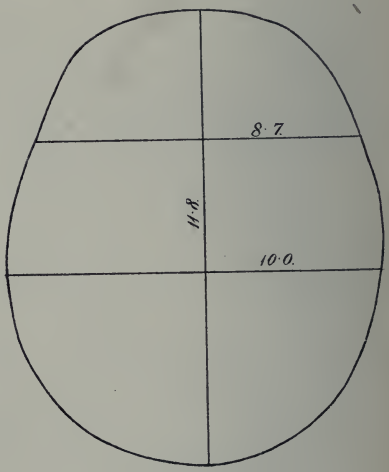

Fig. 4.

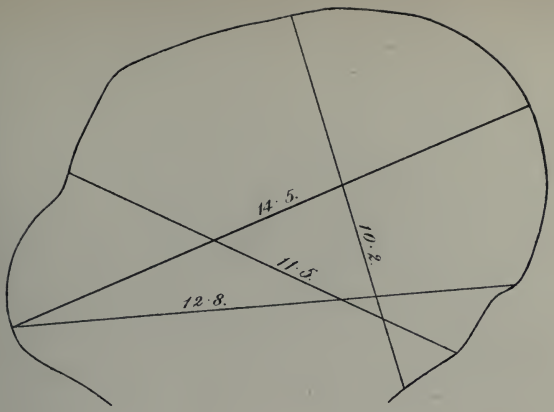

Fig. 5.

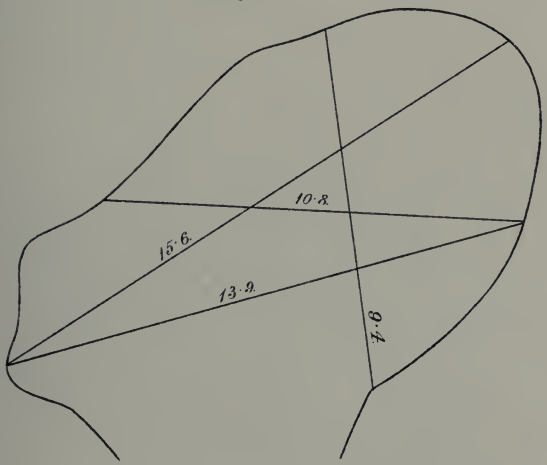

Fig. 6.

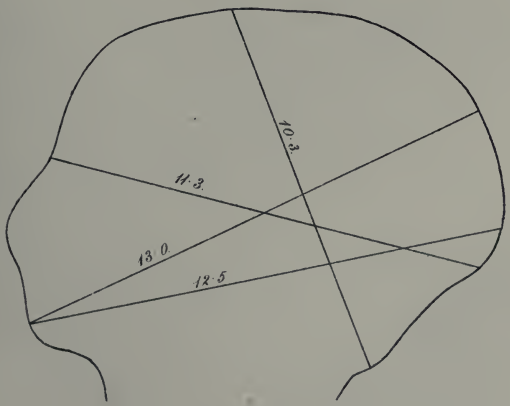

Fig 7

than that found by Cleland. At the time of birth Cleland gives the angle in five skulls and gets an average of 98°. I have measured the angle in ten full-time skulls, and get the average measurement of 84°·8.

Cleland's cases. Orbito-nasal angle.	My own cases. Orbito-nasal angle.
Case I. 102°.	Case I. 87°.
„ II. 94°.	„ II. 77°.
„ III. 103°.	„ III. 93°.
„ IV. 97°.	„ IV. 75°.
„ V. 96°.	„ V. 83°.
	„ VI. 87°.
	„ VII. 88°.
	„ VIII. 91°.
	„ IX. 89°.
	„ X. 78°.

It will be seen that there is a great discrepancy between the measurements in the two series of observations, in Cleland's the angle at birth being more than a right angle (98°), in mine the angle being less than a right angle (84°·8). At the same time, the results in both cases agree in giving the angle at birth as greater than that in skulls of four to eight months' fœtuses, but the difference is not so great in my cases as in Cleland's. In the latter it is 98° to 88°; in the former, 84°·8 to 81°·6. The conclusion which is reached is that there must be considerable variations with regard to the relation of the floor of the anterior cranial fossa to the front of the upper jaw in the infant at birth.

The relation of the soft parts of the head of the infant I must defer until a future occasion.

Description of Plates.

Fig. 1.—Sagittal section of "normal head" (Budin), half natural size.
Fig 2.—Sagittal section of normal head of 7½ months' fœtus, half natural size.
Fig. 3.—Sagittal section of head immediately after normal easy labour.
Fig. 4.—Normal head as seen from above (Budin).
Fig. 5.—Sagittal section of head immediately after labour (O.D.P. position).
Fig. 6.—Sagittal section of head immediately after labour (O.D.P. position, Budin).
Fig. 7.—Sagittal section of head of infant 6 days old, half natural size.

The President made some remarks.

Meeting V.—March 12, 1890.

Dr Berry Hart, *President, in the Chair.*

I. *Dr John Thomson* showed a case of RHYTHMICAL, SWAYING MOVEMENTS OF THE LOWER HALF OF THE BODY in an infant. The patient, a delicate looking little girl of 15 months, had been sent to Dr Thomson at the New Town Dispensary by Dr K. M. Douglas. The present complaint had commenced five weeks previously, along with rather profuse diarrhœa; her teething, which was a little backward, was proceeding at the time. There had been no fits or other nervous symptoms. As to the movements, when the child lay on her back or sat leaning backward, the spasms consisted in an alternate forward and backward movement of the pelvis, accompanied by adduction and abduction, extension and flexion of the thighs, and extension of the legs. When she sat leaning forward so that her thighs became a fixed point, the movement became one of swaying backward and forward of the trunk, with flexion and extension of the legs on the thighs. When she was put on her feet all the movements ceased at once; they also ceased during sleep. Occasionally there was a cessation of the spasms for some minutes, if the child's attention was attracted by anything; but usually they recurred regularly at intervals of about two seconds. There was no similar movement of the head or upper parts of the body, and no nystagmus. There was a slight amount of "facial irritability," light percussion over the zygoma producing contraction of the orbicularis palpebrarum on the same side. The spasmodic movements seemed to cause absolutely no pain or inconvenience to the child. There was enlargement of the costochondroid articulations, but no other signs or symptoms of rickets. The vulvar mucous membrane seemed irritated, and the child was frequently noticed to rub the part. The diarrhœa still existed, although much better; when the stools were numerous, the movements were more marked. One of the patient's sisters, who was now 7 years old, was said to have suffered from the same condition. It began during teething, when she was about the same age as this patient, and was accompanied as in this case by diarrhœa; she also had three fits. The condition lasted in a modified form till the child was about 6 years old—latterly only occurring for a short time when she went to bed at night. The condition was of a functional nature, probably reflex in origin, and depending primarily on the diarrhœa; but also, in all probability, closely connected with the irritation of teething. It seemed likely also that the irritation of the genital mucous membrane was an important element in keeping up the unnatural movements. In this case the treatment had so far been directed against the diarrhœa, and had not been very successful. It was proposed now to

use regular irrigation of the lower bowel with warm water, and to give bromide of potash. There was no condition of the teeth requiring local treatment.

II. *Prof. A. R. Simpson* showed a GERMAN MIDWIVES' OBSTETRIC BAG.

III. *Dr M'Vie* showed (*a*) an early HUMAN EMBRYO, not over forty days old. Patient menstruated on January 8th, the flow lasting four or five days. Fecundation occurred probably on the 15th. Hæmorrhage occurred again on February 22nd, and the ovum was expelled early on the morning of the 25th. (*b*) A specimen of a THREE MONTHS' OVUM.

IV. *Dr Fraser Wright* showed a specimen of MYXOMATOUS DEGENERATION OF THE CHORION, whose history was as follows:—On the 15th February 1890, he was asked to see with a practitioner in Leith a woman, æt. 26, of very neurotic temperament. She was married on June 5th, 1889. She menstruated regularly till the end of September, since which time she had amenorrhœa. About the end of December severe vomiting and salivation commenced, but yielded somewhat to treatment. On the morning of the 8th February 1890 she commenced to bleed, but under proper treatment this nearly ceased till the 14th February, when it became much more severe. On examination the uterus was found to extend to one inch above the umbilicus. It was triangular in shape, the outline slightly but not markedly irregular. No fœtal parts could be felt, nor could fœtal heart sounds be detected. The uterine bruit was distinct. There was no excess of liquor amnii. *Per Vaginam.*—Cervix distinct; os not at all patulous; no fœtal parts felt, nor ballottement made out. The diagnosis made was that either she was six months pregnant, menstruation having occurred during the first two months, or she was only four months pregnant, with some morbid product of conception—probably hydatid mole. She was put on small doses of morphia and ergot, absolute rest in bed being also enforced. The bleeding got much less profuse, and remained so for six days; but on the 21st February Dr Wright was again asked to see her, as she was losing great quantities of blood. There were also severe pains in the back like ordinary labour pains. *Per Vaginam*—The os uteri was slightly dilated, and placental tissue could be felt through it. The blood came in jets during pains. The patient was chloroformed for the purpose of dilating the cervix to empty the uterus of whatever it might contain. But as the first Barnes' bag was being introduced, the uterine contractions got much stronger, and expelled a mass of vesicles. It was unnecessary to proceed further with the dilatation, as the uterine contents were now coming freely through the os, which just admitted the tips of two fingers. Aided by pressure

from above, the uterus expelled nearly the whole mass, weighing probably (exact weight not ascertained) about 3 lbs., a few vesicles which still remained being removed by two fingers in utero. The chief interest in this case lay in the uncertainty of the diagnosis, although the probability of hydatid mole was great. This was because of four months' amenorrhœa with a uterus corresponding in size to a six months' pregnancy, the absence of fœtal parts and heart sounds, and the absence of excessive liquor amnii, so that twins and hydramnios could be excluded. There remained,therefore, the strong probability of hydatid mole causing the enlargement,—always reserving, of course, the possibility of a six months' pregnancy, with probably a low implantation of the placenta. There was no suggestive irregularity in the feel of the uterus, nor had she passed any vesicles. The patient was pregnant for the first time.

Note.—This patient has since died of pyæmia.

V. *Dr Brewis* showed a large FIBRO-CYSTIC TUMOUR OF THE UTERUS, weighing 20½ lbs., which he had removed from a patient by abdominal section. The patient made a good recovery.

VI. *The President* showed (for Dr James Young) a specimen of BATTLEDORE PLACENTA.

VII. *Dr Barbour* showed the most recent form of Neugebauer's VAGINAL SPECULUM, and presented some BOOKS from Dr Neugebauer.

VIII. *Dr Milne Murray* showed a new form of ELECTRIC BATTERY adapted for general medical purposes, including electrolysis. It was the invention of Mr K. Schall of London, and the instrument shown was made by him. The cell was very compact (1 inch square on section), and its electro-motive force was high—1·7 volt. The plates are zinc and chloride of silver, the latter in an asbestos sheath, and the exciting liquid is a solution of caustic potash. The internal resistance is low (about ·2 ohm.), so that 4 to 8 of the cells are sufficient for supplying a laryngoscopic or cystoscopic lamp. The battery is eminently portable, and admirably adapted for gynæcological practice. The laboratory tests show that the cell is very durable, the current being maintained with great constancy, and local action being small.

IX. ON THE TREATMENT OF PELVIC DISEASE BY ELECTRICITY.

By R. MILNE MURRAY, M.A., M.B., F.R.C.P.E., F.R.S.E., Assistant Physician, Royal Maternity Hospital; Lecturer on Midwifery and Diseases of Women, Edinburgh School of Medicine.

IT is now about three years since the attention of gynæcologists was drawn to the treatment of various forms of pelvic disease in

women by means of electricity as practised by Apostoli. The results claimed for this mode of treatment were such as to arrest attention on the part of every one interested in this department of Medicine; and while at the hands of many these results were regarded with a more or less aggressive scepticism, they were by others deemed worthy of more extended examination. In spite, then, of a continuous and sometimes even violent hostile criticism, a large amount of attention has been given to the subject, and the literature has already reached formidable proportions. It goes without saying that much of this literature is of little scientific or practical value, except as showing the risks which patients sometimes run from the perfunctory zeal of their advisers to experiment on a new cure. Conclusions derived from the experience of one or two cases, whether apparently successful or not, can carry little or no weight either for or against the method of treatment. Besides, the question of the permanence of the effect could not be dealt with in cases which were reported the week after the final application. Time, indeed, was an essential requisite both to permit of the accumulation of sufficient material and to test the persistence of the influence. Towards the end of last year the Keiths published the results of their two years' work, and though they give no summary of these results, they detail the cases with considerable minuteness, and the reader can form his own opinions. Their experience has included a sufficient number of cases to warrant the drawing of safe conclusions, and the time elapsing since the first cases were treated permits the question of permanency of influence to be approached, though not of course settled.

At the January meeting of the Society Dr Fraser Wright read a paper giving a most carefully detailed account of twenty-three cases treated by electricity. The paper is of very great value on account of the care with which the condition previous and subsequent to the treatment was recorded. It gives an admirable account of the history of these cases, and the systematic accuracy of the observations in great measure compensates for the comparatively small number of cases as compared with those treated by the Keiths.

During the past two and a half years I have had some experience in gynæcological electro-therapeutics, and I accordingly propose to lay the results of this experience before you in the following paper.

The cases I have to record are forty-five in number. These include all in whom the treatment has been completed. I have excluded those still under treatment, and also a number of patients who came only once or twice, but who for various reasons were prevented from returning, and in whom no indication of any result could be obtained.

The cases have been treated partly in private and partly in St Luke's Home. And I have here to thank Dr Halliday Croom for his great kindness in sending me many of his private patients

for treatment—a large proportion of my cases having been recommended by him. This on his part has been all the more generous, seeing that (I trust I am not breaking confidence in saying so) Dr Croom has never expressed himself as greatly impressed by either the rationale or the results of the method.

In the first place, then, I shall give a brief account of the general results of the treatment as illustrated in the tabular statement, noting in some detail the more important cases; and in the second place I propose to discuss some points connected with the rationale of electrical treatment.

I.

I have presented the cases in four tables.

TABLE I.—Includes those cases in which the most prominent feature of the complaint was HÆMORRHAGE and consequent ANÆMIA.

In this group there are twenty-three cases, and in all these hæmorrhage, menstrual or intermenstrual, in excessive amount, and notably anæmia, were prominent conditions.

In the majority of cases the treatment was carried out by the intra-uterine application of the positive pole. In two only was puncture of the tumour with the negative resorted to.

Columns 1 to 5 give the number of case, age, number of children, and condition previous to treatment.

Column 6 gives the sign and position of the internal electrode.

Column 7 gives the number of applications.

Column 8 gives the average strength of current.

Column 9 gives the total quantity of electricity employed, expressed in ampere-seconds or coulombs.

Column 10 gives the condition after treatment.

I shall hope to show that the figures in column 9 have a bearing of considerable practical importance. So far as I am aware, no one has previously recorded his dosage in these terms. They are obtained by multiplying the current in amperes by the time in seconds for each application, and taking the sum of the results during the whole course of treatment. They indicate the exact quantity of electricity employed in each case. From this we can determine the amount of *work* actually done on the tissues, and, as I trust I shall be able to demonstrate, they enable us to draw some conclusions as to the *modus operandi* of the process.

Of the twenty-three cases, eight were single, fifteen were married, and of these nine were sterile.

Of the twenty-three cases, eighteen had a definite fibroid tumour as the cause of the hæmorrhage. In the others, endometritis and chronic metritis were the chief causes of the hæmorrhage.

In five cases (1, 3, 8, 11, 18) the treatment for various reasons was prematurely discontinued. In none of these cases were there more than eight applications, in most only three or four. Of the

remaining eighteen cases, seventeen have been definitely relieved. In every case the hæmorrhage was checked after three or four applications, even when it had been continuous for months. As the result of further treatment, the intermenstrual periods have been prolonged, and the menstrual discharge diminished to a normal amount. The influence of one or two applications in cases of prolonged hæmorrhage was very remarkable. In one patient who had bled continuously for upwards of three months we found that the hæmorrhage entirely ceased for three weeks after the second application. At the end of this time what was a fairly normal period, lasting a week, occurred. The rapid improvement in general appearance and health of the patients is also well worthy of note. Nearly every one expressed herself as gratified by the increased comfort and fitness for exertion which she experienced early in the course of treatment.

The number of applications varied from 10 to 23, and the total quantity from 498 to 1884 ampere-seconds.

As regards frequency of treatment, I have found that twice a week is most convenient. Some patients might have it oftener with advantage, but on the whole one is wiser to err on the side of too seldom than too frequent applications.

Some of the cases are of exceptional interest, and I should like to refer briefly to one or two of them.

Table I., Case 1.—Miss M., aged 42, single. October 25th, 1887.

For seven years suffered from menorrhagia. This has latterly much increased, and during the last six months the discharge has been almost continuous. Patient is much emaciated and anæmic. Complains of constant gnawing pain in the region of the stomach.

P. V.—Uterus erect or slightly backwards. To the anterior wall is attached a mass about half as large again as a closed fist, pressing down on the anterior fornix, very firm and resistant. Cervix high up and difficult to reach. Sound enters vertically $5\frac{1}{4}$ inches.

Treatment.—Eight negative punctures through anterior fornix, and ten intra-uterine positive applications. Total quantity, 765·4.

Result.—Oct. 31.—After four applications hæmorrhage had quite ceased. Gastric pain seems increased temporarily after each application.

Dec. 24.—After fifteen applications there is a manifest difference in the size of tumour; is certainly not larger than an orange. A sinus 1 inch in depth remains at site of puncture. Two periods have occurred on 2nd November and 7th December, each lasting four days. No other hæmorrhage.

Feb. 1, 1888.—Since last report has been very well. Periods regular, painless, and of normal amount. Mass in front of uterus about size of hen's egg. Sound, 3 inches. Uterus quite movable. Gastric pain entirely gone.

Jan. 1890.—Reports herself in excellent health.

TABLE I., CASE 4.—Mrs R., age 47, married, seven children. October 1887.

For more than a year patient has suffered from profuse hæmorrhage at periods and other times. She is very anæmic and faint.

P. V.—Os patulous and soft. Sound, 4½ inches.

Treatment.—Ten positive intra-uterine applications. Total current, 498·4 ampere-seconds.

Result.—After five applications, profuse watery discharge occurred, which continued till December 6th. On this day it was found that a large mass was being expelled through the os, evidently a polypus, which fills the vagina. The stretched and thinned cervix can scarcely be reached by the finger.

Dec. 8.—Mass is breaking down and highly offensive discharge escaping.

Dec. 15.—A gangrenous mass, highly offensive, about the size of the fist, was expelled. From this date patient's recovery was uninterrupted. Discharged fourteen days later.

Jan. 1890.—Patient reports that since last note her periods have been regular and normal as to quantity, and her general health perfectly satisfactory.

TABLE I., CASE 9.—Mrs Y., aged 50, married, sterile. January 18, 1888.

For many years patient has suffered from chronic uterine hæmorrhage, often very profuse. There is frequently metrorrhagia, and menstruation is associated with much clotting of discharge. Patient is very anæmic, exhausted, and emaciated. No local cause can be ascertained. Uterus normal or slightly subnormal. Ovaries not palpable. Has been under treatment for years without any permanent benefit.

Treatment.—Thirteen positive intra-uterine applications. Total quantity, 616·9.

Result.—*March* 3, 1888.—Discharge has been much less during course of treatment, and regular in occurrence. Patient has improved in appearance and gained in flesh.

Jan. 1890.—Patient reports that she is in excellent health. Periods have been regular and slight. Has gained in flesh, and is able for more exertion than she has been for many years.

Feb. 20, 1890.—Writes to say that since last week of January there has been a return of the discharge, continuous but slight in amount, and without clots.

April 2.—This patient has died of pneumonia.

TABLE I., CASE 17.—Mrs S., aged 35, married, two children. April 30, 1888.

Has been suffering from profuse periods for eighteen months.

For last three months a sanguineous discharge has escaped almost continually, and large quantities of blood have been lost from time to time. Lately she has suffered from down-bearing pelvic pain. Patient is blanched, breathless, and quite unfit for her ordinary duties.

P. V.—The vagina is filled by a mass measuring about 5 inches by 3 inches. The widely stretched os can just be felt round the tumour.

Bi-manually.—The uterus cannot be felt, and sound enters $1\frac{1}{2}$ inch only.

Treatment.—A pair of insulated platinum needles were plunged into the tumour as widely apart as possible and to $1\frac{1}{2}$ inches in depth. A current from forty Leclanche cells was sent through, giving 200 m.a. This gave rise to no sensation. Eighteen such applications were made, with a total quantity, 1160·7.

Result.—May 21.—After seven applications, mass shrunken and more pediculated. Os can readily be felt. Mass breaking down in vicinity of punctures. Quite friable in some parts. There is a slight grumous discharge at times, but no bad odour whatever.

June 4.—Mass greatly reduced in size. It is now seen that uterus has been partly inverted, and a deep sulcus separates uterus posteriorly from tumour anteriorly. When the needles are plunged into anterior mass no sensation is produced, but when in posterior mass, acute pain is complained of.

June 25.—Sound now passes $3\frac{1}{2}$ inches. Uterus can readily be felt bi-manually. Remains of polypus about size of walnut can be felt through the cervix. Since the commencement of treatment, patient has had three periods, normal in amount and duration. She has regained her normal strength, and is in robust health.

Oct. 1.—Periods since cessation of treatment in July have been perfectly normal, and patient in excellent health. The os still gapes sufficient to admit tip of forefinger. A nodule about the size of a hazel-nut can just be felt. Uterus forward; sound, $3\frac{1}{4}$ inches; quite movable.

Of the eighteen cases referred to, one only gave an unsatisfactory result. She was an unmarried girl of 26, who had a slightly enlarged uterus, with a fibroid nodule on the left side. She had twenty-seven applications, and a total quantity of 1884 ampere-seconds (the largest I ever gave), and yet at the end of five months she was little, if at all, better. I cannot account for this; unless, indeed, the fact that she was careless as regards her habits, exposing herself, in spite of all advice, to weather and fatigue, and most indifferent to the action of the bowels. Indeed, the rectum was often so loaded that I could scarcely pass the sound. Whatever may have been the reason, she certainly proved a failure, and the *only* failure I have had in a case of hæmorrhage pure and simple.

Since the patient left—eighteen months—she has not com-

municated with me, and no reply has been received to a letter of recent date.

In almost every case where hæmorrhage has been the prominent symptom I have employed, like most others, the intra-uterine positive pole. The results seem to justify this; and one would, moreover, conclude that this is the preferable method from observations on organised tissue outside the body, the dense, firm coagulum which surrounds the anode suggesting a "hæmostatic" influence.

It is worth noting that patients suffering from hæmorrhage only bear, as a rule, fairly large currents without inconvenience; much larger, for example, than those in whom pain is at all a prominent symptom. I have found also that my results have improved since I have used more extensively an internal electrode of diminished length,—one in which the exposed metallic part is not more than $\frac{3}{4}$ inch in length. This concentrates the current, increasing its density and local action, and the different portions of the uterine cavity can be successively treated by the use of the graduated slide in locating the active part of the instrument. This sound acts like Apostoli's carbon electrode, but has the advantage of being more readily introduced.

As to the menstrual period, I avoid making the application during the first three days, but find that the sooner it is applied thereafter the better. Generally on beginning treatment there is some discharge after the first one or two applications, and if the pain comes on soon after the treatment has been begun, it may be somewhat profuse, and the patient should be instructed to keep quiet at this time.

Table II.—This group includes those in which Pain was the chief feature of the complaint. The causes of the pain varied. In some it was due to the presence of a fibroid, and in one or two of those cases it was associated with hæmorrhage. In others it was due to a perimetric deposit, and in two or three to ovaritis.

There were in all fourteen cases. Of these, Nos. 11 and 12 had to discontinue treatment after five and three applications respectively. Of the others, seven were relieved of the pain in a marked degree, and five were not materially benefited.

The proportion of successes in the cases where pain is the prominent symptom is much less than in the hæmorrhage cases. The cases in which the most marked relief was obtained were undoubtedly those in which an exudation was present to account

for the suffering. One of these—Case 5—is of especial interest, not only as bearing upon the relief of pain, but especially in relation to the absorption of inflammatory deposit,—a result on which Apostoli and many others lay considerable stress.

The case is one of considerable interest, as the following brief history will show:—

Table II., Case 5.—Mrs A.; aged 35; no children. Nov. 23, 1887. Patient has suffered for years from an extensive cellulitic deposit, which fills the pelvis, depressing the vaginal roof and fixing the uterus. During the previous summer the mass had opened into the rectum, causing an intermittent purulent discharge. With a view to the possibility of drainage, Dr Halliday Croom opened the abdomen in June of this year. It was found that the pelvis was roofed in by a mass of solid resistant deposit, which gave no possibility of interference. The patient recovered satisfactorily from the operation. From this time until November the escape of pus was very profuse, and the pain at times very great.

Nov. 23.—The bulging mass was punctured in the posterior fornix, and 30 m.a. passed for four minutes. This was repeated four times at intervals of a week.

Jan. 14, 1888.—Mass in the fornix so ill-defined that puncture could not be effected, and sound accordingly passed into the uterus and connected positive. One hundred m.a. were passed for five minutes. This treatment was repeated once or twice a week until the 25th of July, twenty-five applications being made. Total quantity, 780 ampere-seconds.

Result.—The patient at first was treated at her own house, but after the fourth application she was able to come in a cab to the Home.

March 17.—Patient has walked three-quarters of a mile without undue fatigue. The mass is so indefinite that it cannot be outlined bi-manually. The discharges of pus are smaller and far less frequent, and the patient is immensely improved in health and comfort.

June 20.—Patient is fit for her ordinary duties, and can walk a reasonable distance with comfort. She has gained in weight, and says she is practically quite well.

P. V.—Careful bi-manual examination reveals an indistinct fulness, free from pain, behind the uterus. The latter is freely movable, and otherwise the pelvis is normal.

Jan. 1890.—Patient reports that she is in excellent health, free from pelvic discomfort, and without purulent discharge for a long period. No vaginal examination was made.

Here, then, is one case at least where the electrician can claim a success which was denied to the surgeon. The abdomen was opened by an expert. The condition was definitely recognised, and pronounced irremediable by ordinary surgical procedure. The patient, after a few months, was handed over to the electrician,

and in due course was relieved of her constant pain, was restored to comparative health, and rendered capable of performing the major part of her duty in life. I do not claim that the pelvis is restored to its normal condition, nor am I to guarantee her permanent immunity from a recurrence of her trouble; but I claim, in all humility, that electricity has given her a chance of continuing her *rôle* in life, and that was more than surgery could do.

The failure of electricity to relieve many of the cases of pain is not remarkable. Most of these cases were complicated with organic change in the ovaries, to which the pain was no doubt largely due. And I cannot say that I have seen any definite benefit from the use of galvanism in any case where there was evidence of structural change in these organs. I daresay some of these cases are palliated by Faradism; but my experience of this treatment is limited and of little account. On the other hand, the rapid diminution in the bulk of pelvic exudations, many of them of long standing, is a common experience. Apostoli lays great stress on this effect, both in his early, and especially in his later papers. Dr Fraser Wright in his paper records one most remarkable case, in which a great diminution of such a mass followed a comparatively short course of treatment. No doubt we are aware of many instances where a large pelvic exudation ultimately practically disappeared—but these are either cases of suppuration, or else they extend their course over months or years.

In these cases of pelvic cellulitis the application was made either by puncture into the mass, or else by indirect application through the uterus, or through the vaginal roof at the point nearest to the mass.

The rationale of this action is by no means clear; but I shall defer discussing it until the second part of this paper.

Table III.—This group includes those cases in which the chief cause of complaint was simply the MECHANICAL INCONVENIENCE caused by the tumour. The indication in such cases was obviously the reduction of the mass of the tumour; and those who have followed the reports of many practitioners during the past three or four years will naturally conclude that this is a class of cases in which the best results might be hoped for. We constantly read of tumours reduced by "one-third" or "one-half" their original bulk, and can readily realize the enormous benefit this retrograde change would confer on many a sufferer. Let us see what results have been obtained.

The Table III. contains three cases only. No. 1 complained of some dysuria, and might thus have been more correctly placed in Table II.; but the dysuria was slight, and she suffered more inconvenience from the difficulty she experienced in walking, etc., than in any other way. Eight applications only were made by negative puncture. The os was high up and forward, and a sound

could be passed with great discomfort. The punctures were in the posterior fornix. At the end of this time the patient expressed herself as much easier, but after six months she returned to say that she was as bad as ever. Probably had the treatment been prolonged the benefit might have been more permanent.

The second case was that of a single woman, 34 years of age, who had a firm, painless tumour, about 4 inches above the umbilicus, and somewhat prominent. She had neither pain nor menstrual disturbance, the flow being regular and moderate. But she was concerned about her "figure," though even this was not a matter of urgent consequence, as she was inclined to *embonpoint*, and the abdomen was not specially protuberant. In this case twenty positive intra-uterine applications were made, with a total quantity of 1577 ampere-seconds. The tumour at the end of that time was not in any way diminished as far as measurement could determine, and the patient's condition was practically unchanged.

The third case was that of a lady, 35 years of age, who had a small fibroid in the anterior wall of the uterus, and which seemed to be the only explanation of a succession of abortions. These generally occurred about the fourth to sixth month, and it occurred to Dr Croom that if her tumour could in any way be reduced in size by the current, that she might carry a viable child, a result greatly desired by the patient. With this end in view eleven negative intra-uterine applications were made, with a total quantity of 525 ampere-seconds. Two months after this course had ceased the patient again became pregnant, and again, I regret to say, miscarried at the fifth month.

This group thus has given us anything but satisfactory results, and so far none of the cases can be said to have derived much benefit. It is true that none of them presented urgent symptoms, but they all presented conditions which gave the "deobstruent" effect of the current a fair opportunity. The results are instructive, and they show what has been forced upon almost every observer, namely, that the reduction in size of a fibroid tumour by electricity is in the vast majority of cases comparatively small.

These cases do not stand alone, but must be read along with those in Table I., where a tumour was the cause of hæmorrhage. Now, excluding the case of intravaginal polypus referred to (Case 17, Table I.), I have only had one case (Case 2, Table I.) in which the tumour underwent manifest diminution before the treatment was completed. In her case we started with a mass larger than a fist in front of the uterus, and ended with one the size of a hen's egg three months after. In this case eight punctures and ten intra-uterine applications were made. Regarding the others, the most we can say is, that they became more mobile, which probably indicated a certain amount of diminution, but yet this amount was too small to be recognised by any available means of measurement.

This result is undoubtedly somewhat disappointing to those who formed high anticipations of the "deobstruent" effect of electricity, founded, I think not unjustifiably, on the earlier reports. Yet in the presence of this disappointment, one must not forget that while the tumour retained its *status quo ante*, its most serious accompaniment, namely, *hæmorrhage*, almost invariably disappeared; and this is a result which it seems to me we cannot too prominently push to the front. I shall have something more to say regarding the matter in the second part of my paper.

TABLE IV.—The fourth group included cases of SUBINVOLUTION and of ENDOMETRITIS. This group embraces five cases. These all suffered from enlarged uterus, with chronic endometritis of long duration, and some from menorrhagia as well. In all these cases very marked benefit has been obtained,—so marked, indeed, that one may justifiably declare that in them at least the cure has been complete. They are all still under my observation, and are in excellent health.

Case 6 is specially interesting. She had for upwards of four years suffered from copious leucorrhœa; the uterus was large—$3\frac{1}{4}$ inches by the sound—and very tender. She had had a succession of early abortions, usually about the eighth to tenth week. These were always associated with considerable hæmorrhage, and the periods were profuse. The patient was thin and profoundly anæmic. Everything had been done in the way of treatment. Curetting, repeated cauterisation of the uterus, the hot douche, etc., had all been tried without permanent benefit, abortion always following the succeeding pregnancy. She had eleven positive intra-uterine applications, with a total quantity of 544 ampere-seconds. The treatment was spread over two and a half months. Soon after it was discontinued she became pregnant, and is now approaching her confinement, having been in excellent health. No special precautions were taken at any time,—indeed, about the fourth month the patient slipped and fell on the street without any untoward result.[1]

I am, indeed, convinced that in old-standing cases of endometritis, especially when complicated with areolar hyperplasia, we have in electricity a remedy of great potency, and one which, properly used, is yet destined to yield brilliant results.

From the foregoing review of these cases I think we may safely draw the following conclusions:—

1. The galvanic current properly applied is in nearly every case a means of relieving hæmorrhage when due to a fibroid tumour.

2. In a very small proportion of cases the tumour is considerably reduced in size. In a somewhat larger number, but bearing a small proportion to the whole, the tumour is appreciably reduced, being at the end of the course, or subsequently, more mobile and

[1] This patient was safely confined in April.

probably more compact. In the great majority there is but little difference in the bulk of the tumour as the result of this treatment.

3. In cases of endometritis and subinvolution, a cure may be effected in a comparatively short time, and such cases seem peculiarly amenable to electrical treatment.

4. Deposits resulting from pelvic cellulitis are frequently greatly diminished in amount, and the symptoms greatly relieved.

5. Pain, when the result of these inflammatory deposits, disappears in great measure with their reduction. But when the result of ovaritis, it is less, if at all, affected by the *galvanic* current.

As will be seen from the tables presented, the great majority of cases have been treated by the *intra-uterine positive pole.*

In a few, and for various reasons, electro-negative puncture has been employed; and so far as my experience goes, the chief, and, indeed, only risk seems to be in these latter cases.

In cases of bleeding fibroids, when the intra-uterine positive pole is employed, the patient comes at the appointed hour, undresses immediately, and after the application rests for ten or fifteen minutes; she then dresses, and walks or drives home, as suits her convenience. No special douche of any sort is employed—the patient merely being advised to use the ordinary syringe daily. I take care to immerse the electrode in very hot water, and to lubricate it with antiseptic vaseline.

Where puncture is adopted greater precautions are advisable. When I commenced this treatment I employed for puncture a straight platinum sound with a trocar point and sliding sheath, the metal being exposed about ·5 inch.

My first case (Table II., Case 1) developed symptoms which gave me such an amount of anxiety that it was many months before I summoned courage to employ puncture again.

Table II., Case 1.—Mrs B.; aged 35; no children. Oct. 15th, 1887. Complains of profuse menstruation, dysmenorrhœa, and continuous intermenstrual pain; markedly anæmic, with pinched expression. *P.V.*—The roof is filled with a hard bulging tumour, which extends 2 to 3 inches above the pubes. Cervix is out of reach behind the pubes. The uterus cannot be defined, and the mass is immovable.

Treatment.—Thirteen negative punctures were made, the trocar being passed about 1 c.m. into the tumour through the posterior fornix. The current at first varied from 60 to 95 m.a. The trocar was always reintroduced into the same spot, and at the fourth application it passed directly into the cavity of the uterus. During the later applications the current varied from 90 to 100 m.a., and the duration from five to eight minutes. 413 ampere-seconds were administered in all.

Result.—From Oct. 15th to Nov. 4th patient remained in the Home, afterwards coming for the treatment. At first patient com-

plained of great pain after each application, which, however, lasted for an hour or two only.

Oct. 31.—A sinus about 1½ inch in depth, and of the diameter of a No. 8 catheter, has been formed behind the cervix, which seems to communicate with the uterine cavity.

Nov. 12.—Patient has complained of much pain and backache since last application. The sinus now admits a sound 2¾ inches.

Nov. 20.—Patient came to-day suffering from intense colicky pains, and says that "a shred of something" had come away yesterday. Patient sent home without treatment.

Nov. 23.—Seen at her own home. Pain has been continuous. Pulse, 100; temperature, 101°. A soft mass is found projecting through sinus, a highly fœtid grumous discharge escaping from the vagina.

Nov. 26.—Pulse, 130; temperature, 102°. Discharge very fœtid and patient very prostrate. Mass about size of Tangerine orange, projecting through sinus. Copious douching with corrosive has been constantly employed.

Nov. 27.—A fœtid shreddy mass has been expelled; pulse and temperature have fallen, and patient is less prostrate.

Dec. 5.—Convalescent. Has been seen recently by Dr Croom, who informs me that her condition is pretty much as it was before treatment.

I attribute this very serious result to the presence of the sinus formed by the electrode, and which was of course exposed to the vaginal discharges. And though I have used the same instrument in one or two cases since without any such untoward result, I now employ always a large-sized electrolytic needle of the same form as is used in electrolysis of nævi.

The needle, which is of platinum, is plunged well into the tumour, the vulcanite sheathing passing well through the mucous membrane. The latter is thus in no way corroded by the action of the current. The electrolysis takes place in the deeper parts of the tumour, the slight puncture in the mucous membrane closes up on withdrawal of the needle, and no dangerous surface is exposed.

Moreover, both before and after the application an antiseptic douche is employed, and the patient is advised either to come into the Home for a time, or at least to desist from all active occupation until the treatment is fairly under way.

I am bound to say, however, that the results of negative puncture have not been such as to impress me with its special value. I think it greatly adds to the risk, and I am not inclined to employ it in any case where it is possible to pass the sound into the uterus. In cases where this is impossible, and where hæmorrhage is a pressing symptom, I should, however, not hesitate to employ it, with due regard to the risk involved, in the hope that

it may modify the tumour so far as to permit the uterus to be reached and the sound introduced into its cavity.

II.

I had hoped, in the next part of this communication, to have dealt at some length with a discussion of the mode of action of the electric current in producing the results which have been described in the preceding pages. The rationale of the action of electricity is certainly a matter of profound interest, and it is further a matter which can be largely elucidated, I am sure, by careful experiment and observation, and I am equally sure that without such careful experiments its elucidation is entirely impossible.

But I would here urge one very important matter which I feel is apt to be ignored both by the opponents and the advocates of this form of treatment. Many of those who doubt the efficacy of electricity in gynæcology base their doubt on the ground that its mode of action has not been adequately explained. They say, Show me *how* the thing acts, and then I shall discuss the results.

Now this is to me a most unscientific and impossible position. Are you to take up this position, that because you cannot explain *how* the force acts, you are not to accept the results? Take an analogous case. Are we to demand that, because we are unable to understand how the salts of mercury affect a syphilitic subject, we must cease to employ them in this disease? Are we to ignore the fact that the symptoms of syphilis disappear under the influence of these salts, and decline to interfere with the progress of the disease simply because we cannot understand the *modus operandi* of the antidote? And thus, in spite of the fact that an enormous amount of evidence has been accumulated to prove that the intra-uterine application of the positive pole checks most cases of uterine hæmorrhage, yet because we are unable to state the rationale of the action we are to stand by and let the patient bleed, or else proceed to remove her ovaries. And if, while the laparotomist is sharpening his scalpel, the electrician taps him on the shoulder and asks him, "On what principle do you remove the ovaries?" "What is the rationale of this procedure?" He will say, "I am about to excise and destroy the 'menstrual' nerve." Or, if not so advanced, he will say, "I am about to bring on the menopause," which does not seem to go very far towards an ultimate explanation.

The fact is, the man with a battery and a galvanometer is every whit as "scientific" (to use a cant term) as he with a bistoury and ligature. Their action is equally empiric; they both judge from their results. The one gives twenty or thirty applications of a certain current strength, and finds the hæmorrhage ceases and the patient gains in health and well-being. The other removes the appendages with the same result. The choice of the procedure will depend on a consideration of the risk to the patient and the

permanency of the result. Let us take a simple and quite analogous case. You are called to a man suffering from toothache. You examine the tooth, and say to him, "My friend, you are indeed suffering very severe pain. Now, I have here a solution of a certain substance, a single drop of which, applied to the tooth, will, I know from experience, relieve the pain at once, but as I cannot tell you exactly how it produces this effect, it would be unscientific to use it; so, if you will open the mouth wide enough, I shall pull the tooth out." It strikes me that your patient will prefer to let *you* keep your science while *he* keeps his tooth.

It has been stated by some electro-therapeutists that success in this department demands that a man be first a profound gynæcologist, and, second, a profound electrician. Now, there is a perfectly obvious fallacy in this. A man must certainly be a competent gynæcologist, for the diagnosis and many other responsibilities of the case rest on him; but a profound knowledge of electrical theory is no more necessary to him than is an encyclopædic knowledge of chemistry essential to a man who is to administer a ferruginous tonic. Both must have a practical knowledge of the best ways of prescribing and administering the agents they are to employ; but that is a different thing from a profound knowledge of the chemical and physical laws which determine their production and regulate their action.

It is different, however, when the electro-therapeutists attempt to give a rationale of the action of electricity. Here a very much deeper acquaintance with the phenomena and laws of electrical science is required, and the haphazard theorizing of the superficial serves only to darken counsel. The action of electrical currents on the organized tissues of the human body and their influence in producing change of action and structure is one of the most difficult problems which the electrician has to face. The behaviour of a simple electrolyte, such as a solution of common salt, under the passage of a galvanic current involves problems which are by no means yet solved, and how much more complex must be the conditions when highly elaborated electrolytes like albumen and similar vital compounds are under discussion.

When we add to the action of the current on these regarded as mere chemical substances its action on the contractile, vascular, and nervous tissues, the problem becomes involved to an enormous degree. To one who realizes this, it is not a little surprising to observe the free and easy way in which those who seem to know least say most, and that most confidently, regarding these intricate problems.

As an example of some of the utterances which are being gathered around this subject, let me quote a few sentences from a paper, which some of the Fellows may have read, by Dr Lapthorn Smith of Montreal, in the *American Journal of Obstetrics*:[1]—

"As Mr Tait and Dr Bantock at a recent meeting of the *British*

[1] *American Journal of Obstetrics*, vol. xxii., p. 794.

Gynecological Society made the statement that a fibroid tumour could not be electrolyzed—that is, decomposed into its constituent elements by any amount of current which it was possible to bear, 200 m.a., for instance, for five minutes—I proceeded with my galvanometer and rheostat to an electroplating establishment and interposed them in the circuit while the process was going on, when, to my surprise, I found that 2½ m.a. was the greatest strength they ever employed. In fact, a copper article was completely coated with silver in five minutes with a current of that strength, which, on being weighed, showed that an equivalent of 2 grains of cyanide had been decomposed. Now, if 2 grains are decomposed by 2½ m.a. in five minutes, 480 grains would be decomposed in eleven minutes by 250 m.a., so that sixteen applications of eleven minutes, with a current strength of 250 m.a., would decompose 1 lb. of the tumour."

The circumstantial way in which Dr Smith recounts the details of his visit to the electroplater's, and his account of his observations and his deductions therefrom, might lead some one to suppose that here we had a reliable scientific observation on which we might destroy a few pounds of fibroid tumour per day!

Now, neglecting the fact that the current required to decompose this quantity of silver cyanide would be more than 260 times[1] what Dr Smith states, he calmly assumes that the conditions in the electroplater's cell are comparable with those of a fibroid tumour in the uterus, and he asks us to regard such a neoplasm as identical with a saturated solution of the cyanide of copper. Thus he tells us, in so many words, that since 2 grains of cyanide of silver are decomposed by 2½ m.a. in five minutes, then 1 lb. of fibroid tumour will be decomposed by 250 m.a. in 176 minutes! which is a rule of three on the same lines as this:—"If a herring and a half costs 1½d., how many will 10 men eat in a week?"

This is only one of the many examples of curious reasoning which the literature of this subject already teems with, and which it would be a sheer waste of time for me to detain you with.

I had hoped at this time to have given an account of some experiments which may serve to throw some light on the mode of action of these currents on the tissues, and which may serve to explain some of the phenomena observed; but circumstances have arisen which have prevented me completing them, and I think it better to defer their full discussion until a future occasion.

I should like, however, to indicate one or two conclusions which our present knowledge justifies, and to offer a suggestion based on these which may serve to explain some of the phenomena which arise in our experience of the galvanic treatment of these conditions.

1. Conductors of electricity are of two kinds:—

(*a.*) Those through which the current flows without producing

[1] As a matter of fact I find that 2·5 m.a. in 5 minutes will only decompose ·00931 grains of cyanide of silver.

any permanent chemical change, *e.g.*, metals, carbon, and most solid bodies.

(*b.*) Those in which the current in flowing produces some chemical change, *e.g.*, solutions of salts, albumen, etc., compound liquids generally.

Such conductors are accordingly termed "Electrolytes," and the process of decomposition is termed "Electrolysis."

2. The amount of this decomposition in any given case depends on—

(*a.*) The strength of the current.

(*b.*) The duration of the current.

(*c.*) The nature of the substance.

3. The products of electrolytic decomposition are termed the "Ions," and appear in the immediate vicinity of the electrodes. Those of a basic (metallic, alkaline) character are termed "Kathions," and appear at the negative electrode; those of an acid character are termed "Anions," and appear at the positive electrode.

4. No products of electrolysis appear nor can be detected in the intermediate mass of the electrolyte, except as the result of the *diffusion* of the free ions from the electrodes.

5. The influence of the galvanic current on fibroid tumours and other morbid conditions is generally attributed to this double result of electrolytic conduction:—

(*a.*) The tissue is disintegrated by the passage of the current *per se.*

(*b.*) The *acid* and *alkaline* products of decomposition accumulating at each electrode exert a caustic and further disintegrating effect on the tissues in their vicinity.

6. The following facts enable us to test the validity of these assumptions:—

(*a.*) From a series of experiments on the fresh muscular tissue of various animals—rabbit, sheep, ox—recently killed, I find that 200 milliamperes passed for thirty minutes (*i.e.*, 360 ampere-seconds) break up 110 grains of tissue.

This was arrived at from experiments made in the following way:—The piece of fresh tissue to be experimented on was soaked either in saline solution or defibrinated blood (so as to compensate for the conductivity lost by the removal of the circulation as in the living tissue), and was then pierced by a pair of platinum needles connected through a galvanometer to a battery, and the current passed for the requisite time. The area of electrolised tissue round one pole was then cut across, the unaltered tissue was carefully removed from that showing signs of disintegration, and the two masses carefully weighed. The results on recent tissue over a considerable number of experiments are remarkably constant, and 110 grains for 360 ampere-seconds is rather over than under the average.

(*b.*) Similar experiments on a recently removed fibroid tumour

give smaller numbers—85 to 90 grains being the corresponding quantity.

7. Now, referring to column 9 of the tables appended, it will be found that 1884 ampere-seconds was the largest quantity employed in any one case (Case 10). Hence, provided that the tumour in this case was as decomposible as the tissues under experiment, only 573 grains could have been destroyed by the whole current employed, assuming it was spent entirely on the tumour.

8. In Case 2, Table I., the total quantity employed was 764 ampere-seconds, so that only 220 grains of tumour tissue could have been decomposed directly by the current. Yet in this case the tumour shrunk from a size larger than a closed fist to that of a hen's egg in the course of a few months.

9. In the next place we may consider the effects of the *caustic* action of the acid and alkaline bodies liberated at the electrodes in disintegrating the tissue.

10. I find on calculation that, assuming that the alkaline material set free at the negative electrode consisted entirely of caustic potash (the most powerful caustic base known) liberated from the decomposition of the potassium salts of the blood and tissues, we can obtain by means of 360 ampere-seconds ·17 grains, and with 764 ampere-seconds ·29 grains of KOH.

11. This amount, though quite capable of giving a litmus paper reaction, is a wholly insignificant quantity, and of course quite incapable of any efficient action on the tissues of a myoma.

12. Farther, assuming that the acid substance set free at the anode is hydrochloric acid derived from the decomposition of the chlorides of the tissues, the total quantity set free by 764 units is ·23 grains HCl.

13. Such facts as these, it seems to me, do not admit of any conclusion other than that the diminution of the size of tumours is not to be explained by the direct destruction of tissue by primary electrolysis, nor by the secondary action of the products of such electrolysis upon the surrounding tissues.

14. We must rather look for the explanation of the results of galvanic treatment in a consideration of the special structure of the tumours with which we are dealing.

15. A fibroid tumour of the uterus is essentially a non-vascular structure. Large veins and venous sinuses are frequently found embedded in it, but it possesses no true capillary structure in its interior.

16. The mass of the neoplasm is surrounded by a vascular area of great richness—the capsule; and it is undoubtedly from the vascular region, which presses on the mucous lining of the uterus in the submucous variety that the great hæmorrhage arises. This vascularity is found extending on to the mucous membrane in the vicinity of and beyond the limits of the tumour proper.

17. Provided, then, we could destroy the capillary structure in

this region, we should be able to check or control the hæmorrhage from the uterine surface of the tumour.

18. I am convinced that this gives an explanation of the action of the galvanic current in checking uterine hæmorrhage.

19. The anode (positive pole) produces a firm coagulum in all parts of the tissue in contact with it. A comparatively small current is capable of doing this; and such a current will leave the uterine surface of the capsule of the fibroid completely disorganized—the blood coagulated, and the smaller vessels practically obliterated.

20. Such a result will thus explain the *diminution of hæmorrhage.*

21. But, further, in certain cases of uterine fibroid the vascular area so destroyed by the action of the current may represent a very large part of the nutritive channels of the tumour. In such a case the cutting off of its blood supply may result in a partial atrophy of the tumour; and I would suggest that this offers an explanation of the *reduction in size* of the mass of the tumour in some cases. And this, too, would account for the exceptional character of the occurrence.

22. This may not be the *only* element to be taken into account in explaining these changes, and the absorption of cellulitic deposits would seem to require the presence of another influence.

23. It has been supposed that the current, besides the evident decomposition whose products are manifest at the electrodes, exerts an "interpolar" influence on the electrolytic mass. The nature of this influence is obscure.

24. The following considerations may throw some light on it. According to the generally accepted electrolytic theory of Grotthüs and Clausius, the passage of a current through an electrolyte first arranges the molecules of the substances in such a way that all the kathions turn towards the negative, while the anions turn towards the positive pole.

25. The first unit of decomposition results in the anion nearest the positive electrode being torn from its associated kathion, while the kathion nearest the negative electrode is torn from its associated anion.

26. One might naturally suppose that the two ions left behind by this disruption might satisfy their affinities by uniting, but to do so they must cross the liquid. Now, no ion can by the most carefully applied tests be detected in the process of crossing, and the assumption is that they do not so cross and unite.

27. It is believed that each ion, after the attraction of its fellow to the electrode, attacks, as it were, and displaces the corresponding ion of the nearest molecule in the chain, which in turn attacks its neighbour, until ultimately, by an interchange of the ions of all the intermediate molecules, equilibrium of the mass is again established.

28. These views may be understood by a reference to the subjoined diagrams :—

$$+\begin{matrix}(1)\\H\\Cl\end{matrix}\quad\begin{matrix}(2)\\H\\Cl\end{matrix}\quad\begin{matrix}(3)\\H\\Cl\end{matrix}\quad\begin{matrix}(4)\\H\\Cl\end{matrix}\quad\begin{matrix}(5)\\H\\Cl\end{matrix}\quad\begin{matrix}(6)\\H\\Cl\end{matrix}-$$

Let a solution containing six molecules of hydrochloric acid be traversed by a current of electricity.

The molecules will arrange themselves in a chain. Now the + electrode will attract the Cl of molecule 1, while the − electrode will attract the H of molecule 6. Thus :—

$$+Cl_1\begin{matrix}(1)\\H\end{matrix}\quad\begin{matrix}(2)\\H\\Cl\end{matrix}\quad\begin{matrix}(3)\\H\\Cl\end{matrix}\quad\begin{matrix}(4)\\H\\Cl\end{matrix}\quad\begin{matrix}(5)\\H\\Cl\end{matrix}\quad\begin{matrix}(6)\\\\Cl\end{matrix}H_6-$$

And now equilibrium will be established, not by the crossing of the free H to the free Cl, but by the H(1) displacing the H of HCl(2), and the H(2) displacing the H of HCl(3), which in turn displaces the H of HCl(4), and so on, until ultimately the H of HCl(5) is free to combine with Cl(6). So that, after the decomposition of one molecule, the arrangement will stand thus :—

$$+Cl_1\begin{matrix}H_1\\Cl_2\end{matrix}\quad\begin{matrix}H_2\\Cl_3\end{matrix}\quad\begin{matrix}H_3\\Cl_4\end{matrix}\quad\begin{matrix}H_4\\Cl_5\end{matrix}\quad\begin{matrix}H_5\\Cl_6\end{matrix}H_6-$$

Thus we see that all the remaining five molecules have changed partners.

29. Now in a comparatively simple body such as hydrochloric acid the molecular stability of the new molecules may be not appreciably less than that of the original ones.

30. But in substances composed of highly elaborated chemical constituents such as the tissues of the body are, the continued electrical disturbances and interchange of the components of the molecules affected may produce an amount of molecular instability which may seriously affect the vital process of the tissue involved.

31. Thus it does not seem improbable that the disturbance of the molecular equilibrium produced by the galvanic current in such a substance as a mass of cellulitic deposit may favour materially its absorption by the associated capillaries or lymphatics ; and it seems only natural to suppose that imperfectly organized inflammatory deposits would yield sooner than the more highly vitalized and healthy tissues.

I have made these remarks, not with a view to offer a final explanation of the phenomena under consideration, but rather with the object of showing what seems to me the lines on which the explanation must go, and also that such explanation does not lie, as some would have us suppose, on the surface.

The matter is eminently one for experimental inquiry, and I hope before long to lay some results derived from this source before the Society.

I.—HÆMORRHAGE.

1 No.	2 Age.	3 Married or Single.	4 Children.	5 Complaint.	6 Internal Electrode.	7 No. of Applications.	8 Average Current.	9 Ampere-seconds = Quantity.	10 Result.
1	40	M.	0	Menorrhagia. Small Fibroid.	In Uterus +	2	39	23·4	Treatment discontinued on account of pain produced in ovary.
2	42	S.		Fibroid. Continuous hæmorrhage.	Puncture — / In Uterus +	18	125	764·48	Periods regular; flow moderate; health good.
3	33	M.	0	Small fibroid in fundus. Hæmorrhage.	In Uterus +	7	102	273·6	Patient highly nervous; could not bear sufficient current. No improvement.
4	47	M.	7	Large, soft uterus; profuse and continuous hæmorrhage for many weeks; great anæmia. Sound 4½ in.	In Uterus +	10	113	498·42	Discharged polypus after 11th application; health quite satisfactory since.
5	42	M.	0	Large fibroid 3 in. above umbilicus. Periods 10 to 14 days, very profuse.	In Uterus +	13	191	896·6	Periods steadily diminished. Periods previous to discharge 5 days; amount normal.
6	30	S.		Tumour to umbilicus. Hæmorrhage.	In Uterus +	17	183	1101·	No change in size of tumour. Periods normal.
7	36	S.		Small fibroid in fundus. Menorrhagia 10 to 14 days, profuse; profound anæmia.	In Uterus +	21	159	1130·1	Periods normal; health greatly improved.
8	42	M.	3	Bleeding fibroid; soft retroflexed uterus.	In Uterus +	6	136	269·9	First period improved, but patient did not return for treatment.
9	45	M.	0	Very frequent and profuse hæmorrhage lasting for years. No appreciable tumour or other cause. Very anæmic and feeble.	In Uterus +	13	152	616·9	Periods normal; health excellent.
10	26	S.		Fibroid. Profuse and long-continued hæmorrhage; uterus slightly enlarged; small nodule on left side.	In Uterus +	27	197	1884·2	No improvement when dismissed.
11	52	M.	0	Enormous fibroid. Occasional attacks of severe hæmorrhage, irregular.	In Uterus +	8	196	629·1	No change during treatment. Discontinued on account of bronchitis.
12	39	M.	5	Fibroid 2 in. above pubes. Sound 3⅜ in. Profuse hæmorrhage, 5 or 6 years.	In Uterus +	23	173	1355·1	Tumour unaffected. Periods normal, 3 weeks clear interval. Able for all duties.

13	50	W.	7	Profuse irregular hæmorrhage for last 7 months. Intensely anæmic and breathless. Sound 4 in. Uterus very soft.	In Uterus +	18	212	1489·	Jan. 1890.—No period in last 12 months. Health good.
14	42	S.		Lobulated fibroid reaching to 1 in. below the umbilicus. Tumour flat. Sound 3¼ in. Hæmorrhage. Periods 10 to 14 days.	Puncture —	19	115	860·4	Sept. 1889.—General health greatly improved. Periods 3 days.
15	50	S.		Fibroid 2 in. below umbilicus. Profuse hæmorrhage 6 to 10 days. Sound 4½ in.	In Uterus +	21	152	1768·	Nov. 1889.—No period for 6 weeks; every 28th day since July; very moderate in amount; health greatly improved.
16	47	W.	0	Large fibroid in hollow of sacrum. Great hæmorrhage at periods for last 6 months.	In Uterus +	12	127	606·	July 1889.—Last two periods normal. Jan. 1890.—Periods quite normal. Suffers great pain on walking. Tumour apparently unaltered, impacted in pelvis.
17	35	M.	2	Large intra-vaginal polypus, growing from posterior uterine wall; great hæmorrhage and exhaustion. Uterus cannot be felt bimanually.	Puncture —	18	177	1160·7	Tumour entirely destroyed; uterus normal; os slightly gaping; stump of pedicle about size of hazel-nut. Periods normal.
18	30	M.	0	Menorrhagia following abortion, 18 months, periods lasting 14 days.	In Uterus +	4	123	195·	First period after treatment 4 days. Some ovarian pain relieved by faradic current. Did not return for treatment.
19	34	M.	3	Subinvolution. Endometritis. Menorrhagia. Sound 3¼ in.	In Uterus +	12	99	506·	Uterus 2¾ in.; nonsensitive; periods regular, 4 days. Leucorrhœa gone.
20	27	M.	0	Profuse menorrhagia, "Fibroid" uterus. Period 14 days. Sound 2¾ in.	In Uterus +	10	161	688·2	Period 5 days, otherwise normal. General health much improved.
21	30	M.	0	Large fibroid. Menorrhagia, profuse and almost continuous.	In Uterus +	4	137	231·6	Hæmorrhage ceased after second application; treatment unavoidably discontinued.
22	40	S.		Fibroid 2½ in. below umbilicus. Profuse menorrhagia; profound anæmia and exhaustion.	In Uterus +	19	105	679·4	Periods normal in amount, 3–4 days. Health quite restored.
23	33	S.		Small fibroid in anterior wall. Menorrhagia often very severe. Never more than 6 days' interval.	In Uterus +	15	115	590·	Periods regular—5 days' duration. Health greatly improved.

II.—PAIN.

1 No.	2 Age.	3 Married or Single.	4 Children.	5 Complaint.	6 Internal Electrode.	7 No. of Applications.	8 Average Current.	9 Ampere-seconds = Quantity.	10 Result.
1	35	M.	0	Fibroid. Hæmorrhage. Pain.	Puncture —	13	94	413·8	Nearly succumbed to septicæmia. (See full notes in paper).
2	27	S.		Large fibroid, pain, and hæmorrhage.	In Uterus +	10	119	427·6	Hæmorrhage diminished; no change in tumour or pain.
3	26	M.	0	Great dysmenorrhœa. Periods irregular, delayed. Fibroid anterior wall. Uterus $3\frac{1}{2}$ in.	In Uterus +	8	169	487·5	General health greatly improved; last period free from pain.
4	32	M.	3	Great dysmenorrhœa. Endometritis. Deposit in right fornix.	In Uterus +	6	162	385·2	Pain and deposit entirely gone. Discharged quite well. Still well in January 1890.
5	35	M.	0	Large perimetric deposit filling up pelvis; uterus entirely fixed; constant pain.	Puncture —	25	101	753·6	Mass greatly diminished, causing no inconvenience.
6	25	M.	1	Subinvolution; dysmenorrhœa; left ovary prolapsed; uterus tender; sound $3\frac{1}{4}$ in.	In Uterus +	6	54	94·5	No improvement.
7	40	S.		Enlarged retroflexed uterus; backache; great difficulty in walking.	In Uterus +	30	149	1373·7	Temporary improvement, but relapsed after treatment ceased.
8	48	S.		Fibroid in posterior wall; uterus acutely retroflexed, impacted; great metrorrhagia; great pain and exhaustion.	In Uterus +	22	162	1238·5	Floodings ceased; pain continues; no change in tumour.
9	26	M.	1	Chronic ovarian pain; great dysmenorrhœa; periods profuse; sound $3\frac{1}{4}$ in. Uterus anteverted; left fornix depressed and tender.	In Uterus +	11	126	450·6	Pain quite gone; fornices clear; sound $2\frac{3}{4}$ in. Health excellent.
10	18	S.		Dysmenorrhœa; small anteverted uterus, very tender; left ovary very sensitive.	In Uterus +	7	58	110·4	Pain gone; periods normal.
11	30	S.		Menorrhagia; anteflexed uterus, slightly enlarged, soft and tender.	In Uterus +	5	153	104·7	First period diminished in amount and free from pain; treatment unavoidably discontinued.
12	21	M.		Great pelvic pain; left ovary tender, prolapsed and fixed.	In Uterus +	3	55	23·4	10 days after treatment pain much relieved; unable to return for treatment.
13	38	M.	4	Backache; chronic endometritis; cervix highly sensitive. Dysmenorrhœa. Uterus $3\frac{1}{2}$ in.	In Uterus +	7	114	322·6	Uterus $2\frac{3}{4}$ in. Sensitivity gone; slight leucorrhœa; last 3 periods painless.

III.—TUMOUR. Not hæmorrhagic nor painful.

1 No.	2 Age.	3 Married or Single.	4 Children.	5 Complaint.	6 Internal Electrode.	7 No. of Applications.	8 Average Current.	9 Ampere-seconds = Quantity.	10 Result.
1	41	M.	0	Large fibroid. Some pain. Dysuria.	Puncture —	8	110	309·95	Dysuria temporarily relieved; subsequent relapse 6 months after.
2	34	S.		Large fibroid of posterior wall, 4 in. above pubes; sound forward $2\frac{3}{4}$ in. Periods nearly normal.	In Uterus +	20	206	1577·1	No alteration in tumour.
3	35	M.		Repeated abortions caused by small fibroid. No menstrual or other disturbance. Sound $3\frac{1}{4}$ in.	In Uterus —	11	113	525·	January 1890.—Miscarried again.

IV.—SUBINVOLUTION AND ENDOMETRITIS.

1	26	S.		Perimetric deposit behind and on left side of uterus; great pain in left ovarian region; uterus and ovaries fixed. Chronic endometritis.	In Uterus +	11	114	459·1	No local improvement, general health improved.
2	48	W.	5	Chronic endometritis. Leucorrhœa and menorrhagia. Uterus $3\frac{1}{2}$ in.	In Uterus +	22	146	1470·6	General health greatly improved. Uterus $2\frac{3}{4}$ in. Leucorrhœa very slight, serous.
3	45	M.	4	Chronic endometritis; periods somewhat scanty and painful. Uterus enlarged.	In Uterus —	9	100	310·8	Discharge ceased; periods painless.
4	46	M.	7	Chronic endometritis. Subinvolution. Uterus very tender; sound $3\frac{1}{2}$ in.	In Uterus +	3	99	39·6	Uterus $2\frac{3}{4}$ in. Organs perfectly normal. Health excellent.
5	42	M.	4	Chronic endometritis. Uterus retroverted. Sound $3\frac{1}{4}$ in.	In Uterus +	3	96	113·4	Uterus $2\frac{3}{4}$ in. Discharge very slight. Wears pessary with comfort.
6	34	M.	1	Chronic endometritis; profuse leucorrhœa; repeated abortions.	In Uterus +	11	139	544·24	Uterus normal; leucorrhœa gone. Patient since confined at term.

Dr Halliday Croom congratulated Dr Fraser Wright on the careful analysis of his cases which he had read; and to Dr Milne Murray he ventured to offer his congratulations upon one of the most carefully scientific papers on the electro-therapeutics of the uterus he had ever listened to. Dr Murray had advanced four theses with regard to the influence of electricity in the treatment of uterine disease:—(1.) With regard to hæmorrhage,—he was entirely at one with him in the conclusion he had drawn from his experience, that the continuous current reduced hæmorrhage. This was entirely in accord with what Dr Croom had found; but he was obliged to make this proviso, that the effects were but temporary. This, he thought, was no argument against Dr Murray's treatment, because after all, the great majority of fibroid tumours required but temporary treatment to allow them to go on to a favourable issue. He did not think that electricity possessed in this respect any claims superior to those of rest, ergot, hamamelis, and other styptics, but he did think that it was more elegant and perhaps more persistent for those who were in a position to bear the expense of having it. He had not met with cases in which the cure of hæmorrhage by electricity was permanent, though he believed that at or near the menopause its effects were more distinctly palliative than any other form of treatment. (2.) With regard to pain,—he was obliged to say that so far as fibroid tumours were concerned, the great majority of cases where pain was accentuated —with, of course, the exception of those where the tumour was being expelled—were those cases where the pain depended upon some cystic or other degeneration of the ovaries. In so far as that was concerned, he had found the most complete abolition of pain, and at the same time of the other symptoms associated with fibroid tumours by removal of the uterine appendages, and he was disposed to think, from a considerably extended experience of removing the appendages in such conditions, that in those exceptional cases where radical treatment was required at all—and they were very few—this operation offered by far the best results. He was distinctly of opinion that where a tumour was increasing in size, where the hæmorrhage was marked, and where pain was a distinct symptom, and where the tumour was not bigger than a four months' pregnancy, and further, where the patient was not at or near the menopause, laparotomy gave the most satisfactory results. (3.) With regard to diminution of the tumour, he was obliged to say that he had never in his experience met with any tumours which had shown any disposition to diminish through the influence of electricity more than by any other means. On the contrary, he had found more significant cases of diminution in size from simple rest and ergot than from any electric treatment whatever. Rather was he inclined to think that the electric current increased the development of muscular tissue, and his experience had been that some tumours had grown more rapidly after the use of the electric

current. So far as his experience went he had never seen any tumour whatever whose dimensions had been permanently reduced by electricity. (4.) In regard to the therapeutic use of electricity in cellulitic and other deposits his experience was distinctly limited, but so far as it went, although not questioning for a moment the accuracy of Dr Murray or Dr Wright's cases, he was obliged to say that he had not met with the same favourable results. There, if ever, he would welcome treatment, because after the ordinary recognised treatment of cellulitis had been exhausted he had nothing to fall back upon, and he gladly hailed any treatment which would offer a means of dissipating these distressing complications. But so far as his personal experience went, electricity had not fulfilled the expectations which its promoters had led him to anticipate. Lastly, with regard to the theory of its action, he thought that the positive pole seared and destroyed the mucous membrane just in the same way as any other escharotic; and on living tissue, therefore, unless persistently continued, was but temporary, and he believed that its beneficial effects, if any, on the tumour itself were secured by the contraction of the muscular fibres of the uterus and the resulting diminution of the blood supply to the tumour.

Professor Simpson thought the Society was to be congratulated not only on the excellence of the papers in which the subject had been brought before them, but on the lively criticism of these with which Dr Croom had opened the discussion. Dr Croom was hardly correct in saying that there was no dispute as to the relative value of laparotomy and electricity, because the air of gynæcology was full of clamour on this very point, and it was delightful to find that the subject can be discussed among us with all courtesy and good feeling. The contributions made by Dr Wright and Dr Murray were both of great value, and as Dr Wright had explained that the cases that form the basis of his communication had been treated under his (Prof. Simpson's) observation, he wished to state that the records were every way trustworthy, and that Dr Wright had expressed very correctly the kind of impression that he himself had formed as to the value of electricity in the treatment of uterine fibroids and pelvic inflammations. The treatment required much patience on the part of the gynæcologist who would carry it out successfully, but unquestionably it was much safer than laparotomy, which in his (Prof. Simpson's) view should not be had recourse to in most cases of uterine fibroid until the influence of electricity properly applied had proved a failure.

Dr J. W. Ballantyne said that it was difficult to eliminate entirely other methods of treatment in cases where the electrical treatment was being administered, for the patients were in most cases enjoying the benefit of hospital diet and hygiene, and were also having more rest than was possible for them to have outside the Infirmary. The vaginal douching incidental to the battery treatment ought

also to be taken into account in estimating the benefit derived from the treatment by electricity, more especially in cellulitis cases. With regard to the effect produced by the electrical current in the case of fibroid tumours, Dr Ballantyne thought that both Dr Wright and Dr Murray had left too much out of account the various changes of a degenerative kind which ensue in fibroids in which there is disturbance of the circulation, *e.g.*, fatty degeneration, absorption of fat, calcification, etc. He was much struck by the frequency with which hypogastric pain followed the application of the battery, pointing as it did to inflammation in or around the tumour. The papers of Drs Milne Murray and Fraser Wright were most valuable and trustworthy additions to our knowledge of the theory and practice of electricity in gynæcology.

Dr A. H. F. Barbour had read with great pleasure the careful record of Dr Wright's cases, which contrasted favourably with the mass of papers on this subject, in which there was oftener merely an expression of opinion rather than a careful statement of facts. He thought that the question at issue was not whether the electrical treatment benefited fibroids—there could be no doubt of its beneficial effects—but what place electricity was to hold in the treatment of fibroids. All methods of treatment might be classed under two heads—medical, which was largely a treatment of symptoms; surgical, which dealt with the morbid condition. In which category were we to place electricity? He thought in the former. No doubt it sometimes, though rarely, caused a tumour to diminish in size, but ergotin (especially when given hypodermically) had done the same. The weight of evidence was going to show that electrical treatment was symptomatic, and that electricity ranked with ergotin. He had been greatly impressed by what Dr Steavenson, the electrician to St Bartholomew's Hospital, had said,—"That it was a question whether, in the case of hospital patients, the advantage obtained by the electrical treatment is sufficiently great over other modes of treatment as to call for the expenditure of time and trouble necessary for carrying it out."

Dr Fraser Wright, in reply, thanked the Fellows for the kindly way in which his paper had been received. He thought the Society was greatly indebted to Dr Milne Murray for his valuable paper, and was very pleased that such a profitable discussion had followed the two communications on this important subject. He wished to ask Dr Murray if he commonly punctured tumours through the anterior fornix, as this was opposed to Apostoli's practice, owing to the great risk of penetrating the bladder. Also, he would like to know if the cases of subinvolution recorded were successful as regards diminution in size of the uterus. Dr Croom had stated that, in so far as he had any experience of this treatment, the results, though satisfactory for the time being, were not permanent. But Dr Croom was likely to see *only* those cases in

which a recurrence of the symptoms had taken place, so that his experience in this respect could not be applied to the effects produced in general. Still, it was very satisfactory to note that, in his opinion, operation should be the *dernier ressort*—exactly the position the paper advocated. In so far as the question of competition between the two methods—operative and electrical—was concerned, Dr Wright did not at all agree with Dr Croom. He (Dr Wright) thought there was a great deal of competition, so much so that not a few gynæcologists would never recommend the electrical treatment at all, preferring—though, it must be admitted, on unsatisfactory and often very unscientific grounds—the more familiar, more brilliant in its immediate effect, and less tedious treatment, viz., operation. But, as Professor Simpson had already just mentioned this, he would not discuss it further. Dr Ballantyne had taken exception to Dr Wright not having absolutely discounted many possible factors in the treatment employed. For example, he mentioned that the patients were still getting a hot douche, but as they had been douched (and much more frequently and thoroughly) before the electrical treatment was commenced, and without any benefit, this objection was of no weight. In reply to Dr Barbour, he had to state that ergotin by subcutaneous injection had not been tried previous to commencing the electrical treatment. The feeling of those Fellows who had spoken evidently was, that before having recourse to operative measures a trial of electricity should be made—a conclusion in which all who had practical experience of the question would undoubtedly concur. And even if the results were often not absolutely permanent, they frequently conferred immunity from suffering for a considerable length of time, where no operative procedure could be expected to produce such a beneficial effect.

Dr Milne Murray, in reply to Dr Croom, said that while in his (Dr Croom's) case there was no question between electricity and laparotomy, one had only to read the discussions which had taken place elsewhere to see how keenly the matter had been contested, and how marked was the partisanship evinced. In reply to Dr Wright, he said that in the case referred to he had punctured the anterior fornix because he could not reach the posterior one. Naturally in all cases where possible he should prefer puncture in the posterior fornix for obvious reasons. But he wished to say that in his opinion puncture was always to be avoided if possible. Its benefits were usually problematical, and its risks very imminent.

X. REPORT OF THE ROYAL MATERNITY AND SIMPSON MEMORIAL HOSPITAL, FOR THE QUARTER ENDING 31ST JULY 1889.

By ALEXANDER KEILLER (Junior), L.R.C.P. & S.E., and W. G. AITCHISON ROBERTSON, M.B., C.M., B.Sc.

INTERN CASES.

FROM 1st May to 31st July 1889 there were 65 women admitted to, and delivered in, the Hospital. This number includes 33 primiparæ and 32 multiparæ.

Primiparæ, 33.

Age.—Minimum, 18; maximum, 34; average, 23·3.

Presentation.—Vertex, 30; pelvic, 2; face, 1.

Position.—Left occipito-anterior, 23; right occipito-posterior, 5; right occipito-anterior, 2; left mento-anterior, 1; left sacro-anterior, 1; right sacro-posterior, 1.

Duration of Labour.—First stage: Minimum, 4 h. 30 m.; maximum, 62 h.; average, 15 h. 5 m. Second stage: Minimum, 25 m.; maximum, 6 h.: average, 2 h. 32 m. Third stage: Minimum, 5 m.; maximum, 45 m.; average, 22·5 m. Whole labour: Minimum, 5 h. 25 m.; maximum, 66 h. 30 m.; average, 18 h. 17 m.

Classification of Labours.—Natural, 19; laborious, 11; complex, 1; preternatural, 2.

Infants of Primiparæ.—Male, 18; female, 15. Length of child: Minimum, 16 inches; maximum, 20 inches; average, 19 inches. Weight of child: Minimum, 4 lbs. 2 oz.; maximum, 8 lbs. 12 oz.; average, 7 lbs. 4 oz. Weight of placenta: Minimum, 14 oz.; maximum, 2 lbs. 2 oz.; average, 1 lb. 5·8 oz. Length of cord: Minimum, 13 inches; maximum, 33 inches; average, 23·4 inches.

Male Children of Primiparæ, 18.—Length of child: Minimum, 17 inches; maximum, 20 inches; average, 19·3 inches. Weight of child: Minimum, 5 lbs. 4 oz.; maximum, 8 lbs. 11 oz.; average, 7 lbs. 5 oz. Weight of placenta: Minimum, 14 oz.; maximum, 2 lbs. 2 oz.; average, 1 lb. 7 oz. Length of cord: Minimum, 19 inches; maximum, 33 inches; average, 24·9 inches.

Female Children of Primiparæ, 15.—Length of child: Minimum, 16 inches; maximum, 20 inches; average, 18·6 inches. Weight of child: Minimum, 4 lbs. 2 oz.; maximum, 8 lbs. 12 oz.; average, 7 lbs. 2·5 oz. Weight of placenta: Minimum, 1 lb.; maximum, 1 lb. 12 oz.; average, 1 lb. 2·6 oz. Length of cord: Minimum, 13 inches; maximum, 33 inches; average, 21·8 inches.

Multiparæ, 32.

This number is made up of 22 who were ii.-paræ; 3 were iii.-paræ; 2 were v.-paræ; 2 were vi.-paræ; 1 was a vii.-para; 1 an viii.-para; and 1 a xii.-para.

Age.—Minimum, 20; maximum, 35; average, 26·8 years.

Presentation.—Vertex, 30; breech, 1.

Position.—Left occipito-anterior, 27; right occipito-posterior, 1; right occipito-anterior, 2; left sacro-anterior, 1.

Duration of Labour.—First stage: Minimum, 1 h. 45 m.; maximum, 10 h.; average, 6 h. 39 m. Second stage: Minimum, 5 m.; maximum, 11 h.; average, 1 h. 26 m. Third stage: Minimum, 0; maximum, 50 m.; average, 21·7 m. Whole labour: Minimum, 2 h. 10 m.; maximum, 15 h. 30 m.; average, 8 h. 26 m.

Classification of Labours.—Natural, 26; laborious, 3; complex, 2; preternatural, 1.

Infants, 31.—16 males, 15 females. Length of child: Minimum, 17 inches; maximum, 21 inches; average, 19·18 inches. Weight of child: Minimum, 5 lbs. 6 oz.; maximum, 9 lbs. 10 oz.; average, 7 lbs. 6 oz. Weight of placenta: Minimum, 10 oz.; maximum, 2 lbs. 8 oz.; average, 1 lb. 7 oz. Length of cord: Minimum, 15 inches; maximum, 36 inches; average, 23 inches.

Male Children of Multiparæ, 16.—Length of children: Minimum, 17 inches; maximum, 21 inches; average, 19·1 inches. Weight of children: Minimum, 5 lbs. 6 oz.; maximum, 8 lbs. 12 oz.; average, 7 lbs. 5 oz. Weight of placenta: Minimum, 1 lb. 2 oz.; maximum, 1 lb. 15 oz.; average, 1 lb. 6·9 oz. Length of cord: Minimum, 17 inches; maximum, 32 inches; average, 22·7 inches.

Female Children of Multiparæ, 15.—Length of children: Minimum, 18 inches; maximum, 21 inches; average, 19·2 inches. Weight of children: Minimum, 4 lbs. 8 oz.; maximum, 9 lbs. 10 oz.; average, 7 lbs. 7 oz. Weight of placenta: Minimum, 10 oz.; maximum, 2 lbs. 8 oz.; average, 1 lb. 7·2 oz. Length of cord: Minimum, 15 inches; maximum, 36 inches; average, 23·4 inches.

From the preceding figures we may make some interesting and curious deductions:—

1. That the relative number of malpositions is greater in primiparæ than in multiparæ.

2. As regards the duration of labour.

(1.) The average duration of the first stage in multiparæ is much less than one-half what it is in primiparæ, being 15 h. 5 m. in the latter, and 6 h. 39 m. in the former.

(2.) The length of the second stage in primiparæ is nearly twice as long as it is in multiparæ, lasting, on an average, 2 h. 32 m. in the former, and 1 h. 26 m. in the latter.

(3.) The average duration of the third stage is nearly alike in the two classes of patients. This is due to the fact that this stage was always artificially terminated if the placenta were not spontaneously expelled within 25 or 30 minutes.

(4.) The average duration of the whole labour is, in primiparæ, 18 h. 17 m.; while in multiparæ it is less than one-half, or 8 h. 26 m.

3. The number of labours which were either laborious or required instrumental aid is much greater in primiparæ than in multiparæ, as was to be expected.

4. (1.) The number of male births is greater amongst primiparæ than amongst multiparæ.

(2.) The length of the child (the average is taken from both male and female children combined) borne by the multiparæ is greater than the length of the child borne by the primiparæ.

(3.) The same holds good as regards the weight of the children.

(4.) The placenta in multiparæ is also heavier than in primiparæ.

(5.) But the umbilical cord is slightly longer in primiparæ than in multiparæ.

Now, comparing the male and female children of primiparæ together, we find—

(6.) That the average male child of a primipara preponderates over the average female child of the same in every particular. It is heavier, longer, has a much larger placenta, and a much longer umbilical cord.

(7.) While if we compare the male and female children of multiparæ together, we find that the reverse holds. The average female child of the multipara is heavier and longer than the average male child of the same, and possesses a heavier placenta and longer cord.

If now we look at the male children of primiparæ and multiparæ together, we find that—

(8.) Their average weights are similar; the male of the primipara is slightly longer than that of the multipara; the placentæ are nearly alike as regards weight, but the umbilical cord of the primipara is more than two inches longer than that of the multipara.

Now, lastly, if we compare the female children of primiparæ and multiparæ together, we find that the advantages to the child are all on the side of the multipara.

(9.) The female child of the multipara is much heavier and longer, is attached to a much heavier placenta by a much longer cord than is the child of the primipara.

Children.—There was no case of deformity. In one child the posterior part of the first visceral cleft separating the first and second post-oral arches was ununited at birth. It was merely a small opening behind and at the lower part of the pinna of the right ear, and a probe could be passed in for a short distance. There was a red scar leading down from it towards the neck in the position of the cleft. The child was otherwise fully developed, and in a few days the opening became completely closed up.

Placentæ.—Two were battledore in shape, and other two were remarkable for the large size of the blood-clot which came away with them. One clot, weighing 11½ oz., was embedded in the

substance of one placenta, and in the bag of membranes of another was a clot weighing 1 lb. 5 oz. In two cases the placenta and membranes were expelled along with the child.

Membranes.—Two children were born with *cauls.* One of these was interesting medico-legally. In this case the caul extended right over the face and encircled the neck. On the child making an inspiratory effort the membrane covering the mouth was drawn in, and showed well how easily the child might have been suffocated had the caul not been removed at once. In two cases the membranes remained unruptured, and protruded through the ostium vaginæ as a bag. In one case in which the placenta and membranes were expelled along with the child, the membranes were very tough, and had only a very small tear, through which the child had escaped.

Cords.—In four cases the cord was round the child's neck, and in one of these cases it was also tightly drawn round the chest of the child under its arms. In one case of very precipitate birth, where the child was expelled while the patient was standing, the cord was torn through, and, contrary to what is usually stated, there was pretty severe hæmorrhage from the fœtal end of the ruptured cord, and it required to be ligatured to stop the flow.

Classification of Labours.—Natural, 44; laborious and instrumental, 14; preternatural, 3; complex, 3.

Natural Labours.—Seven were cases of precipitate birth. One of these was typical. The patient was in her fifth pregnancy, and at full time. She had taken castor-oil the preceding evening, and after this had felt slight pains, as she thought, due to the medicine. She had had an evacuation of the bowels, and, while standing, three violent expulsive pains came on, and the child was expelled on to the floor, the cord snapping at the same time. The patient was a strong, powerful woman. In another the second stage was very short, owing to the fact that there was no perineum, as it had been ruptured almost to the anus in a preceding labour. In another precipitate case the patient, a vi.-para, felt no pains till the membranes ruptured, and then a few strong pains expelled the child.

Laborious Labours numbered 14. Forceps were required in 2 cases for threatened inertia uteri; in 9 for prolonged second stage, with no advancement of head; in 2 cases of persistent occipito-posterior position; and in 1 right occipito-posterior case. Two cases were very prolonged, due to the excessive amount of liquor amnii present. In one of these cases the membranes had to be ruptured before the head would engage at the brim.

Preternatural Labours.—These were pelvic presentations, one being right sacro-posterior and the other left sacro-anterior in position.

Complex Labours.—These were two cases of placenta prævia, one at the seventh and the other at the eighth month.

Premature Births.—One child was born at the eighth month, strong and healthy, though small. Another at the same age lived about three weeks, while one at 7½ months lived two days.

Ophthalmia Neonatorum occurred only in two cases, and in these at quite different times. Both were rapidly cured by the use of a strong solution of nitrate of silver (20 grains to ℥j.) No prophylactic was used except thorough washing of the eyes with water immediately after birth.

Puerperium.—There were two cases in which a widely-diffused scarlatiniform rash appeared. It was much brighter in the one case than in the other, and appeared on the second day after delivery. At first it consisted of small red points, in which the papillæ were enlarged, and, on the body, resembled the rash of scarlatina closely; though on the face it was rather blotchy and purplish, more resembling measles. The spots grew in size and gradually coalesced. It extended over the chest, abdomen (most marked under the binder), forehead, face, and on the flexor aspects of the arms and legs. It had disappeared on the fourth day after its onset. The temperature never rose above 99° F. There was only a slight itchiness in the skin for one day. In the second case the rash was never so brilliant. It came out on the third day post-partum, and, though it extended all over the body, it was most marked on the face, round the nipples, and under the binder. It lasted two days, and then faded. The temperature was normal throughout. There was a rise of temperature only once, and this was in one of the cases of placenta prævia, when one evening it rose to 101° F. After giving one intra-uterine douche of corrosive sublimate solution (1 in 5000) it fell and did not again rise. The breasts of one child began to swell six days after its birth. On the seventh day they were both tender and inflamed, and a milky fluid could be squeezed out of both. In spite of treatment an abscess formed in the right breast and required incision, while the inflammation in the left breast resolved.

Mortality.—1. There were no maternal deaths.

2. *Fœtal.*—In both of the cases of placentæ prævіæ the child was dead-born. In another case the fœtus was partially decomposed when born, and the skin was peeling off in parts. The mother had felt no fœtal movements for some days prior to the birth.

3. *Infantile.*—The premature 7½ months' child lived two days, while the 8 months' child lived three weeks. One still-born child, delivered by forceps, was resuscitated, and lived ten hours.

The following cases are worthy of greater detail:—

I. *Case of Placenta Prævia.*

Mrs P., age 33, fifth pregnancy, and then at the eighth month. Her previous labours were normal, and she had had no miscarriages. The history was, that she had been last unwell at the beginning

of December 1888, but that in March of this year she had a red discharge (probably due to slight placenta separation). She felt fœtal movements for the first time early in April. At an early hour in the morning of 13th July she was suddenly attacked by a severe flooding, and this continued more or less severely till 11 A.M. At this time she was found sitting up in bed and bleeding rather profusely. On examination the os uteri easily admitted one finger, and the cervix was soft and dilatable. Posteriorly a tough fibrous structure (placenta) could be felt along with much blood-clot, which broke down under the finger. The bleeding was slightly more profuse with each pain, but the latter were few and slight in character. Four carbolised plugs were introduced, and patient was taken to the hospital at once.

On admission she was seen by Dr Keiller (senior), who felt the head presenting and re-introduced the plugs. At 3 P.M., as there was, in spite of the plugging, still a good deal of oozing, the wool was removed with many clots, and now the os uteri admitted two fingers. The plugs were again introduced, but more firmly. Careful abdominal auscultation failed to discover the presence of the fœtal heart. At 8.30 P.M. the bleeding was again profuse, and on removing the plugs the os uteri was found to admit three fingers. There was a great mass of clotted blood at the upper part of the vagina and in the cervix. The lower part of the placenta could now be easily felt posteriorly and detached from the lower uterine segment. A very hot douche was given to wash out the clots, but on examining a few minutes after, the vagina was found to be again filled with large clots and fluid blood. The case was now urgent, as the patient was becoming exhausted; so, having anæsthetized her, the hand was introduced into the vagina and all the clots scooped out—quite a basin full. The lower half or three-quarters of the placenta was now easily felt detached, and situated on the posterior and lower part of the uterus. Gradually insinuating the fingers through the os uteri, the hand was introduced into the uterus, and, having ruptured the membranes, nearly the whole of the placenta was found to be detached, only the upper part remained adherent to the uterine wall. The head of the child was now presenting along with the separated part of the placenta; and as the child was dead, we thought it better to remove the placenta first, which we did after separating the part which remained attached to the uterus. The head now presented along with the right arm; but, in order to expedite the labour, version was performed and the right leg brought down. Suprapubic pressure was applied and the child at once expelled. No more bleeding took place, but the patient was very exhausted, and the uterus did not contract very well till some very hot douches had been given, and ergotin hypodermically. Ether was injected, and brandy given by the mouth as soon as the patient became conscious. She made a perfectly satisfactory recovery, the temperature only once, on

the evening of the 17th, going up to 101° F., but at once falling after an intra-uterine douche of corrosive sublimate solution (1 in 5000) had been given. The patient left on July 24th quite well.

This was a good example of placenta prævia, in which the placenta was implanted low down posteriorly, and almost entirely on the expanding zone of the uterus. There was no pulsation in the cord even when the placenta had just been extracted, and on the birth of the child the fœtal heart could not be heard. It was a premature female child of 7½ months, weighing 4 lbs. 8 oz., and appeared to have been dead for several hours previous to its birth.

II. *Another Case of Placenta Prævia.*

A. M. L., aged 24; second pregnancy. Patient was admitted to Hospital on the morning of June 23rd, with severe hæmorrhage. Her last catamenial discharge was in the beginning of October, and she first felt stirrage at the middle of March. Previous to admission she had had three floodings, viz., on the 2nd, 12th, and 19th of June. These came on suddenly and causelessly, and the two latter were very severe, and rendered her very anæmic and weak. On admission at 8.30 A.M., the os uteri allowed two fingers to enter, and as the bleeding was severe, the vagina was plugged and 10 grains of quinine were given. Uterine contractions soon came on, and at 12 o'clock noon one of the plugs was expelled. The remaining plugs were then removed along with some clots. The os uteri was now fully dilated, and on passing the fingers anteriorly a fibrous structure was met with. This was the lower edge of the placenta. The bag of membranes protruding through the os was finger-of-glove in shape. The presentation was pelvic and in the first position. Chloroform having been given, the membranes were ruptured, and the left knee and foot brought down, and then the labour ended naturally. No pulsation could be felt in the cord, and the fœtal heart never beat after birth. Covering the lower half of the maternal surface of the placenta were many adherent blood-clots, showing where the early separation had taken place. The membranes were entire excepting the rent through which the child had escaped, and this rent was just at the margin of the placenta, thus proving the low placental insertion. The placental seat here was not so low down as in the preceding case.

III. *Face Case.*

Mrs H., aged 27, primipara; delivered 6th May. At 5 P.M., the position was right occipito-posterior. Gradually the head became more and more extended, and consequently more of the face became palpable, till it became a left mento-anterior face case. The descent now became very slow though the pains were strong and frequent. The presenting face was greatly swollen, and a large caput was felt

on the forehead. The finger could be introduced into the mouth and the gums felt. On reaching the perineum the chin rotated under the pubic arch, and the face presented directly in the vaginal opening. The perineum was very tight, but at last the head was born at 8.20 P.M., and the body followed immediately. The lips of the child were greatly swollen and everted, and on the left malar region there was a large caput succedaneum, and on the middle of the forehead another. The swelling of the face had nearly gone by the next day, and by the 10th the discoloration had also disappeared.

IV. *Hydatiginous Degeneration of the Chorionic Villi.*

Mrs B., aged 43, has had seven previous pregnancies. This patient was sent to the Hospital on the 8th June from the Royal Infirmary, to which she had been admitted three days previously on account of swelling of the legs and enlargement of the abdomen. The swelling of the legs had gone, but the abdominal tumour still remained. Uterine contractions came on at 7 A.M. on the 8th, and at 11 A.M. she was brought to the Maternity Hospital.

She did not think that she was pregnant, and had felt no fœtal movements. She had a red discharge which had continued for a month. The patient was a small woman, very emaciated and old-looking. Her skin was of a dark brownish-yellow colour, but the conjunctivæ were not coloured. On examination at 12.15 P.M., the fundus uteri was found to be on a level with the umbilicus, and the contractions were strong. The uterus felt hard during the pains, but soft and doughy in the intermissions. No fœtal heart could be heard. Per vaginam the os uteri admitted one finger easily, and was blocked up by a soft, toughish, round mass, attached to the middle of which was a free irregular body. As the hæmorrhage was severe, plugs were inserted and stimulants given. At 2.30 P.M., Dr Keiller (senior) removed the plugs. The os uteri was then fairly well dilated. Patient was anæsthetized, and the hydatiginous mass removed by the fingers. It weighed about 3 lbs., and at one part was the partially absorbed placenta, and this was the part which had first presented.

V. *Case of Long-suspended Animation.*

N. P., aged 18, primipara. This was a persistent occipito-posterior vertex case. At 10.15 A.M., 1st June, the os uteri was almost fully dilated, and the pains continued regularly the whole day. At 7 P.M. the condition was the same, so chloroform having been given, the membranes were ruptured and high forceps applied. The descent of the head was much hindered by the anterior lip of the cervix and the anterior vaginal wall prolapsing. The former was pushed up above the sinciput during a uterine intermission, but the latter could not be so dealt with, as the forehead pressed

too firmly on the pubis. The head was slowly and with difficulty drawn to the pelvic outlet, the conjugate of which was considerably diminished by the presence of the prolapsed vaginal wall; but after much delay the child was born at 8.40 P.M. The child when born showed no signs of life, pulsation in the cord having entirely ceased; but on auscultation the child's heart was heard to be beating. The cord was immediately tied and the child removed. Artificial respiration (Schultze's and Sylvester's methods) was commenced along with alternate immersions in baths of hot and cold water. These were continued in turn for an hour and a half before the child took its first feeble voluntary inspiration. The only circumstance which induced us to persevere so long a time was the fact that the fœtal heart still continued to beat. On three occasions ℥ v. sulphuric ether were injected into the umbilical vein. The voluntary inspirations were at first very feeble, and at once ceased when artificial respiration was interrupted, so this had to be kept up constantly. Alcohol was rubbed over its body, and small enemata of brandy were given, while ammonia and ether were held to its nose in the hope of stimulating the respiratory centre. After applying these various methods constantly for 3½ hours, the child commenced to make rhythmical voluntary inspirations. These, immediately after the cessation of artificial respiration, were strong, but gradually became weaker till they almost ceased, when the same means had again to be resorted to for a short time. At first the voluntary respirations were only 14 per minute. Direct inflation of the lungs by applying our mouths to that of the child's was then resorted to, and air was thus blown into the lungs. These combined methods improved the condition of the child, and the respirations now increased to 24 per minute. They were now purely voluntary and much deeper than at first. The child was now, respiration having been established, wrapped in cotton wool and blankets and put into a cot near the fire with hot-water bottles on each side of it. This was at 12.30 A.M. At 2.30 A.M., 2nd June, the respiration was still the same. At 5.15 A.M., the breathing became very feeble, rapid, and hardly audible, and on auscultation râles were heard all over the chest. The heart was beating very feebly, ℥ v. ether were injected. This seemed to revive the child for some time. Convulsive movements were present at this time, manifested by clonic spasms of the arms, legs, and chin. At 9 A.M. it was in much the same condition, and at 9.45 A.M. the convulsions became more severe and the child died.

This case is one which ought to afford us great encouragement in perseveringly using the various methods of resuscitating apparently dead-born children for a longer time than we are in the habit of doing. In this instance it was fully 1½ hours before the child made any voluntary inspirations, and even then, the treatment had to be kept up for two hours longer before it could

be trusted to rely on its own voluntary efforts. It was unfortunate that in this case the child ultimately died (due, doubtless, to the excessive and long-continued pressure on its head), but still it lived sufficiently long to establish the truth of the assertion, that we ought to persevere for a longer time than we usually do with the artificial methods of respiration, and the various means of stimulating the respiratory centre.

Extern Cases.

During the quarter ending 31st July 1889, there were 177 cases delivered at the patient's own home.

This number is made up of 24 primiparæ and 153 multiparæ.

Primiparæ, 24.

Ages.—Minimum, 17; maximum, 43; average, 22·29 years.

Presentation.—Vertex, 24.

Position.—Left occipito-anterior, 20; right occipito-anterior, 1; right occipito-posterior, 2.

Classification of Labours.—Natural, 19; laborious, 2; preternatural, 0; complex, 2; abortion (3rd month), 1.

Infants.—Male, 13; female, 10.

Multiparæ, 153.

Of these there were 25 who were ii.-paræ; 21 were iii.-paræ; 23 were iv.-paræ; 9 were v.-paræ; 15 were vi.-paræ; 21 were vii.-paræ; 17 were viii.-paræ; 9 were ix.-paræ; 7 were x.-paræ; and 6 were xi.-paræ.

Age.—Minimum, 20; maximum, 45; average, 30·32 years.

Presentation.—Vertex, 139; breech, 3; transverse, 1.

Positions.—Left occipito-anterior, 133; right occipito-anterior, 3; right occipito-posterior, 2; left sacro-anterior, 3; right acromio-anterior, 1.

Classification of Labours.—Natural, 137; laborious, 2; preternatural, 1; complex, 2; abortions, 11.

Infants.—Male, 91; female, 54.

Details of the Cases.

Instrumental Labours.—Forceps were used in four cases, twice for inertia uteri, once for right occipito-posterior position of head with slight contraction of the brim, and once for simple long delay in the second stage.

Preternatural Labour.—This was a pelvic presentation in the first position. The child was premature and dead-born.

Complex Labours. Two of these were cases of twins. One was a transverse presentation with prolapse of the cord, and the fourth, a right occipito-posterior case, was complicated with heart disease in the mother, and which proved fatal to her.

One of the twin cases happened in a primipara of 17 years of age. She suffered from slight septic poisoning for some days, but the temperature was gradually reduced by the use of corrosive sublimate douches and quinine internally. Both children were born alive.

The second case of twins was in a multipara. The first child was born naturally, while the second presented transversely. The second bag of membranes was ruptured and a leg drawn down, and the labour finished. The placenta was single, but there were two separate amniotic sacs. Both children were alive but very small, the second specially so.

Abortions.—One at 2½ months, six at 3 months, two at 3½ months, one at 5 months, and one at 6 months.

Delay in the 3rd Stage occurred in four cases. In one case the placenta was really adherent to the uterine wall, and required to be scraped off by the fingers. It was very fibrous, and the woman had suffered from localised pain in the right side of the uterus for some months previously (placentitis). In other two cases the placenta was merely retained in utero; while in one case it was found to be lying in the vagina.

Peculiar Child.—This was a premature child of 6½ months. The umbilical cord was only 2 inches in length, and so the child was closely connected to the placenta, which was expelled at the same time as the monstrosity. The lower limbs were badly developed and deformed. The anus was imperforate, and the sex quite indefinite. The abdominal viscera, bowels, liver, and stomach protruded through the abdominal wall (exomphalos). It lived five minutes. The patient had given birth to a healthy child previously.

In another case the child had single hare-lip extending round one side of the nose up to the eye, and also cleft palate.

Mortality.—(1.) Maternal, one, from cardiac failure. (2.) Fœtal, 9.—Two were premature; one presented by the breech; one was a transverse presentation; four were syphilitic or with fatty degeneration of the placenta; one was putrid when born. (3.) Infantile, 7.—Five premature children lived only a short time, varying from a few minutes to six hours. The twin children of the primipara both died, the boy having lived 5 days and the girl 7 days.

A few of the more noteworthy cases:—

I. *Case of Heart Disease; Death during 2nd Stage.*

M. B., aged 43, primipara. This patient was seen the day previous to her death. At this time she complained of severe pain at the lower part of the præcordia, and of flatulence, which she attributed to indigestion. She looked even older than what she stated her age to be. Her pulse was very weak and somewhat irregular. The first sound of the heart was muffled and impure,

and the beat slow. The vagina was very narrow, and the os uteri difficult to reach, as it was high up, and the coccyx was firmly bent forwards. The os uteri was not at all dilated.

Labour pains came on next day. On arriving the patient was found lying unconscious in bed. Her breathing was very slow and characterised by shallow gasps. Per vaginam, the os uteri was fully dilated, the membranes ruptured, and the head low down in the pelvis; but the examination was very hurried, as the patient required immediate attention, for the respirations were becoming fewer, and they soon ceased altogether. The eyelids were widely open, and the eyeballs directed upwards, the pupils being contracted. Thirty minims of ether were injected, and artificial respiration commenced. The heart was beating very feebly at this time, but it soon ceased. Those in charge of the patient said that for some hours previous to her death she had remained in a semiconscious condition, and had only once or twice given a rational answer, usually paying no attention to questions, though she tried to bear down when urged to do so.

The result of a partial post-mortem examination made by Dr A. H. F. Barbour, was that death was due to fatty degeneration of the heart.

II. *Case of Transverse Presentation.*

Mrs M., aged 25, fourth pregnancy. On arrival the right arm of the child, together with a large loop of the umbilical cord, were found projecting through the ostium vaginæ. The attendant said that this had been the condition for two hours. Pulsation in the cord had, of course, entirely ceased. By abdominal palpation the head was found to lie in the right iliac fossa, and the right shoulder was found to present at the os uteri. The patient having been anæsthetized, the hand was introduced alongside of the prolapsed arm, and the left foot of the child seized and drawn down, and on gentle traction being applied to it the breech was brought down, and then the head expelled by suprapubic pressure. The child had apparently been dead for several hours.

III. *Abortion; Hour-glass Contraction, with Prolapse and Anteversion and Fibroid Tumour of Uterus.*

Mrs M. was delivered of a five months' child at 3 A.M. On arriving at 6 A.M. the placenta had not yet been expelled. Per vaginam the os uteri was found to be directed posteriorly, the body of the uterus lying forwards and fixed in this position. The anterior lip of the cervix was much thickened and enlarged, while the whole uterus was prolapsed. By gentle pressure above the pubis the uterus could be pushed down and the cervix easily made to project through the ostium vaginæ. On steadying the uterus from above, two fingers could be introduced through the os externum, but only one could be with difficulty introduced

through the internal os, which was greatly contracted and undilatable by the fingers. The placenta could be felt lying free in the body of the uterus, which was not contracted. Chloroform having been administered, the internal os was stretched by the fingers, but it was quite unyielding and resistent. Several hot douches were given, and fragments of the placenta were scraped away. At last a small portion of the placenta was washed through the contracted os internum by the stream of water. This was at once seized, and gradually the whole placenta was drawn through together with the membranes. This state of spasmodic stricture of the os internum was no doubt aggravated by a dose of liquid extract of ergot which had been given previously. On the anterior surface of the uterus could now be felt a rough, hard, subperitoneal or intramural fibroid tumour, which remained hard during the uterine relaxations, and even when fully contracted the uterus remained of the same size as the post-partum uterus at full term. In this patient we had, therefore, all these pathological conditions at the same time, viz.:—Hour-glass contraction of uterus with retained placenta, anteversion and prolapse with enlargement of the cervix uteri, along with fibroid tumour of the uterine wall.

Meeting VI.—April 9, 1890.

Dr Underhill *in the Chair.*

I. *Dr J. W. Ballantyne* showed A UTERUS BICORNIS SEPTUS. The patient from whom the specimen was obtained was 28 years of age, married but sterile, and died of pernicious anæmia. The breasts were undeveloped, and there was no hair on the pubis. There was no history of menstrual pain or irregularity. The cervix uteri was single but small, and lay almost flush with the vaginal vault. The sound passed into the uterus to a distance of only $1\frac{1}{2}$ inches. At the fundus uteri there was a distinct depression between the two horns, and on cutting the uterus open, a distinct septum, broad above and narrower below, was seen extending from the fundus to a point near to the os uteri externum. Attached to the fimbriated extremity of each tube was a cyst with a long pedicle. The vagina, ovaries, and Fallopian tubes appeared to be normal.

II. *Dr Brewis* showed—(1.) A DERMOID CYST of the ovary which he had removed from a patient 58 years of age. The cyst is of large size, and its character is made evident by the presence of a single tooth in the cyst wall. (2.) DISEASED UTERINE APPENDAGES, consisting of enlarged ovaries, in one of which a corpus luteum the size of a shilling piece is seen, and greatly thickened Fallopian

tubes. The patient had long suffered from severe pelvic pain, due to a retroflected uterus, underneath which lay both ovaries in Douglas' pouch, rendering the use of pessaries intolerable. Her medical attendant therefore asked Dr Brewis to remove the ovaries, in the hope of permanently relieving the patient of her symptoms. Both the above patients made excellent recoveries.

III. A CASE OF MYOMECTOMY FOR A LARGE FIBRO-CYSTIC TUMOUR OF THE UTERUS.

By N. T. Brewis, M.B., F.R.C.P.E.

In May 1888, Miss M., an unmarried lady of 43 years of age, consulted me on account of abdominal enlargement. She stated that she had noticed the swelling for four years, and that it caused her no pain. Menstruation was regular, the discharge moderate in quantity, lasting from two to three days.

On physical examination the abdomen was found to be enlarged in an irregular manner to a point about 3 inches above the umbilicus. A hard nodular swelling about the size of an orange was felt in the hypogastric region, separate from the upper part of the enlargement which was evidently made up of two large sub-peritoneal fibroids. The circumference 2 inches below the umbilicus was 40 inches. The vaginal portion of the cervix was pulled up above the pubis. A hard nodule was felt in Douglas's pouch, and appeared to be continuous with the swelling in the hypogastric region. The uterine body could not be differentiated.

The diagnosis made at this time was that the patient had three sub-peritoneal fibroids growing from the posterior surface of the uterus, two of which grew upwards, while the third grew chiefly downwards into the pelvic cavity. As the patient's condition gave rise to little inconvenience and to no urgent symptoms, treatment at this time was unnecessary.

The next time I saw Miss M. was about two months ago, when she came to tell me that the swelling had grown very much lately, and that, on account of its size, it was now a great inconvenience to her, that she had great difficulty in walking, and that it interfered with her breathing. She expressed herself willing to submit to any operation, and to run any risk for the chance of getting relief. On examining the abdomen I found that it was enormously distended, the upper part of the swelling reaching to the ensiform cartilage, and at the sides, especially the left, extending well down into the flanks. On palpation, the characters of the swelling were felt to be quite different from what they were two years before. Then the tumours were of hard consistence; now, two large cysts, one occupying the greater part of the left side of the abdomen extended into the left hypochondriac region and left flank, the other filled the whole of the right side and extended upwards

beneath the ribs. Fluctuation was well marked in both cysts. A third swelling was felt in the right iliac region, partly solid and partly cystic, running down into Douglas's pouch, where fluctuation was well marked. The enlarged uterine body occupied the hypogastric region.

The question of diagnosis now presented itself. In looking over the record of cases of fibro-cystomata in recent literature, I find that, previous to opening the abdomen, nearly every case had been diagnosed as ovarian. In my case if I had not seen the patient two years ago, when there was little doubt that she had fibroid disease, I would certainly have said that she had an ovarian cyst. As it was, I was in doubt as to whether there was not a co-existence of ovarian cystic with fibroid disease of the uterus. Believing as I do that you can only with certainty diagnose any intra-abdominal condition after you have entered the abdominal cavity, in this case I reserved my diagnosis.

On the 22nd of February, assisted by Mr T. Macdonald and Dr A. Thomson, I opened the abdomen. The abdominal walls were very vascular—a circumstance which points to fibroid disease—and the peritoneum was deeply red in colour. The tumour was found to consist of three portions, two of which were almost entirely cystic, one occupying the left and the other the right side of the abdomen, while the latter was continued down into the pelvis. The third was smaller than its neighbours, and lay in the left iliac fossa, while all three were connected to the right posterior part of the fundus by a pedicle about 2 inches long and 1½ inch thick. The uterus was enlarged to about twice the normal size, and was drawn upwards by its connexion with the tumour. The omentum was firmly adherent over the whole of the anterior and lateral surfaces of the two large cysts, its bloodvessels were greatly dilated, its lymphatics enormously so—being as thick as the little finger and in clusters attached to the upper surface of the tumour. The tumour was also entirely adherent to the peritoneum along its left lateral border, and also posteriorly to the whole of the posterior pelvic wall down to the foot of Douglas's pouch. The largest cyst was tapped, and about two pints of bloody serum removed. The flow came in a small intermittent stream, and as the cyst was very little diminished by the tapping the incision was extended to 3 inches above the umbilicus. The tumour was now forced through the wound and the omentum ligatured. The tying of the omental vessels occupied a long time, as nearly every vessel was secured separately with a double ligature. This is absolutely necessary, as these vessels bleed both ways, *i.e.*, from the tumour itself as well as from the omental side. The vessels were divided between the ligatures. The peritoneal adhesions also gave a great deal of trouble, especially in the pelvis. Ultimately the tumour was separated and cut away after its pedicle had been secured in a Köeberle's wire constrictor. Many of

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the adhesions and omental vessels had to be tied over again, and a rent in Douglas's pouch about 3 inches in length required, on account of persistent oozing, to be stitched with fine silk. The abdominal cavity was then freely flushed with hot water, and the wound closed after the pedicle had been transfixed with pins. A drainage-tube was left in.

The operation lasted over four hours, the greater part of which time was taken up in tying adhesions, over 150 ligatures being left inside the abdomen. Hot water, without any antiseptic, was used during the operation for the sponges and for flushing the abdomen.

The patient has made an uninterrupted recovery. The highest temperature registered was 99°·4. The drainage-tube was removed on the second day, and the clamp on the fifteenth day.

Description of Tumour—Naked Eye.—The tumour weighed 20½ pounds, and contained about 12 pints of bloody serum, which on standing did not coagulate, and on microscopic examination showed broken down blood corpuscles. After evacuation of the fluid the main part of the tumour appears ovoid in shape, and measures about 13 inches in length. The upper half of the anterior surface is covered by omentum, which is in some parts firmly adherent to the tumour. Also attached to the upper part of the tumour is a piece of peritoneum about 6 inches square. The surface of the upper part is smooth, that of the lower is nodular. Attached to various parts of it are broad peritoneal bands. On section the main part of the tumour is found to be divided by a band of fibroid tissue, about 2 inches in thickness, into two compartments, the upper being the larger. Both compartments were filled with bloody serum contained in a fine trabecular meshwork, formed of what appeared to be softened muscular tissue. (This meshwork explains why the blood did not flow freely from the cyst when tapped.) The meshwork is separated from the wall of the cyst by a thin layer of what appears to be degenerated capsule. The contents of the cyst attached to the main tumour were blood and red pulpy material. There was no meshwork, and the degeneration appeared to be in a more advanced stage.

Microscopical.—Dr Woodhead very kindly undertook to make a microscopical examination of the tumour, and the following is his report:—

Specimen I. is taken from a nodule growing from the outer aspect of the cyst wall, and represents the degenerative process at an early stage. Specimens II. and III. are from the margin of the band of fibro-myomatous tissue stretching across, and dividing into two compartments, the main part of the tumour. These specimens show the process at more advanced stages.

Specimen I.—Outer portion of tumour consists of bundles of non-striped muscular fibre interlacing in various directions. A small quantity of fibrous tissue between the bundles, nearer the centre the fibrous tissue becomes much more marked, and the

muscular bundles are much smaller. Passing still nearer to the centre the fibrous tissue becomes more homogeneous looking, and in some cases is of a distinctly mucoid character. Where this is the case the muscular tissue is undergoing degeneration, and there are also small collections of brown pigment. This is evidently a process of degeneration towards the central part of tumour; this process is always most marked at the margins of the cavity, from the wall of which this muscular mass is taken. In this piece there are no traces of hæmorrhage. The vessels in the tumour are fairly numerous, and some of considerable size. Where the mucoid change is well marked the nuclei have entirely disappeared.

Specimen II. shows exactly the same thing, except that in this specimen we have several areas of fibrous tissue, increased mucoid softening, and muscular degeneration. Even the walls of the vessels in Specimen II. are undergoing a hyaline or mucoid change, and in this case there is a little mass of blood surrounded by a hyaline mass. In all cases there seems to be degenerative change in the walls of the vessels.

Specimen III.—In section 3 we have the appearance presented in number 2. From a part of the wall near the cavity there is a mass of broken down red blood corpuscles, the result of hæmorrhage. The mucoid change very well seen, but there is something that is not seen in any of the other specimens. A very considerable increase of cells, small oat-shaped cells, almost like those of granulation tissue, a number of large spindle cells, and at one point a number of round cells. This granulation-like tissue appears to be invading on the fibroid or mucoid tissue, it is perfectly distinct from the granular masses imbedded in the mucoid tissue, which must be looked upon as remains of muscular fibre. It is much more like sarcomatous tissue. Dilated sinus-like blood-containing spaces are very numerous in this granulation tissue mass.

In Specimen III. granulation tissue is present, which Dr Woodhead says is sarcomatous in appearance. From these sections we gather that the process consisted in mucoid degeneration of the fibrous tissue and walls of the bloodvessels, with the subsequent development of sarcomatous cells. In the muscular fibres the degeneration was less marked. In the cyst cavity the whole of the fibrous tissue had softened and disappeared. Hæmorrhage, with resulting debris, followed the mucoid change in the walls of the bloodvessels. The trabeculæ, which stretched across the cavity, must be looked on as degenerate muscular fibre. The tumour must therefore be considered a *myxosarcoma*.

In conclusion, I may remark that fibro-cystic tumours do not disappear after the menopause, and if left alone they prove fatal. Removal of the appendages does not stop their growth, electrolysis could only be dangerous, medicines are useless, so there is no treatment short of removal of the tumour.

Some may question the way in which the pedicle was treated, and ask why I did not adopt the intra-peritoneal method in a case which appeared so suitable for it. My answer is that I followed the extra-peritoneal plan to save time, and because I knew it was perfectly safe. The patient's excellent recovery I attributed to three things—Firstly, to the careful tying of the adhesions; secondly, to the free flushing of the abdominal cavity with hot water; and, thirdly, to the non-use of antiseptics in the abdomen. The drawing which I show you, and which is an excellent representation of the tumour, was very kindly executed for me by Mr Angus Macdonald. To Dr Woodhead my best thanks are due for his great kindness in making the microscopical examination.

Dr Ballantyne congratulated Dr Brewis on the eminently successful termination of an operation requiring great skill and patience on the part of the operator. He quite felt that in cases like that just narrated nothing short of removal of the tumour was likely to prove of permanent value, removal of the appendages was ineffectual, and electrolysis was dangerous in the case of fibro-cystic masses. He agreed with Dr Brewis as regarded the difficulty of diagnosis in such cases. In one case he remembered there was a diagnosis of fibro-cystic tumour made, and when the abdomen came to be opened it was found that there was a fibroid tumour of the uterus and a cystic growth of the ovary. Dr Ballantyne supposed that had time allowed Dr Brewis would have treated the pedicle in the manner recommended by Martin, and dropt it into the abdomen.

Dr Underhill congratulated Dr Brewis on the successful issue of such a difficult and dangerous case, and one which must have required all his courage and resource. He was struck by the circumstance that the fluid did not coagulate, as it was formerly taught that the difference between the fluid from a fibro-cystic uterine tumour and that from an ovarian cyst lay in the fact that the former coagulated when cold, and the latter did not. It was a very useful observation. He agreed with Dr Brewis that no treatment but extirpation was of any avail in the case of large and growing fibro-cysts. He would like to know what reason Dr Brewis had for stating that his success in the case was partly due to the avoidance of antiseptics?

Dr Brewis thanked the Society for their kind remarks. He was of opinion that the use of antiseptics in the abdomen was frequently followed by considerable constitutional disturbance, and since he has discontinued using them the patients have recovered without rise of temperature in nearly every case.

IV. NOTE UPON CONCEPTION WITH UNRUPTURED HYMEN.

By W. Macfie Campbell, M.D., Liverpool.

Some months ago a young lady was brought to me, by a relative of the young man to whom she was engaged, as she had not felt well lately. Something about her appearance caught my attention as she entered the room, and I made inquiry as to her menstruation as soon as possible. She had not been unwell for three months, but that had occurred before—she was listless, tired, breathless, and did not know what she felt. She said she was always plump, and did not think her bust or figure increased.

Examination of the mammæ revealed dark areolæ, distended cutaneous veins, and a milky fluid was easily expressed from the nipples. By the stethoscope the fœtal heart was readily detected. I thought it prudent to ask the relative to step into another room, and then told my patient that she was pregnant. I have frequently had to make such an announcement, but have never seen it received with such amazement and incredulity. "Utterly impossible," she said, but still with something in the expression which meant that there was a possibility. Still insisting, she told me that opportunity having twice offered, her fiancé had got into her bed, and had imperfect intercourse with her. No penetration nor attempt at penetration had been made. This was afterwards corroborated by the young man, whom I sent for. On examination, the blue appearance of the vulvar mucous membrane was well marked, and the hymen was perfect, but admitted the forefinger without causing much pain. The young man was so positive, that I saw he feared some other paternity, but I could assure him that she was virgo (!) *intacta*. The parties were married soon after, and it was not until six weeks after that, that penetration was effected, with a sensation of rupture.

Some years ago I had two confinement cases within a few days, in which both husbands told me they could not understand their wives' pregnancy, as intercourse had never been perfect. In one case I had to divide the distended hymen bilaterally to allow the head to emerge; in the other there was no great difficulty in dilatation.

Dr Gooch (*Important Diseases Peculiar to Women*, Sydenham Society, 1859) relates a case of a lady privately married, in whom he diagnosed pregnancy, and was met by the statement of impossibility. Her husband had avoided injury to the hymen, and both considered pregnancy impossible. The event, however, proved Dr Gooch to be right.

In the *Medical Times and Gazette*, vol. i., 1876, Dr Braun, Vienna, gives three instances of the same. In the first case coition had taken place in a dilated urethra, and Dr Braun supposes ejaculation had taken place prematurely. Delivery took place with-

out injury to the vagina, the hymen rupturing at the last moment. In the second case, a girl of 16 years confessed to one imperfect attempt at intercourse. The orifice in the hymen only admitted a goose quill. The third case was exactly similar in age and history.

Dr Braun draws the following conclusions briefly, that,—1st, An unruptured hymen is no proof of virginity; 2nd, An individual may exist as a virgin in the anatomical, though not in the gynecological sense; 3rd, Pregnancy is possible without penetration.

In the same journal, vol. ii., 1881, Surgeon-General Francis relates the case of an officer's wife, in whom pregnancy was declared impossible by husband and wife, the reason being a tense hymen, which had resisted penetration, and which only gave way after a long delay in delivery.

These cases are of great interest, as throwing doubt upon the theories of uterine activity in the act of impregnation, and of exact apposition of the orifices of the urethra and cervix as being necessary, and rather point to the entrance of the semen into the uterus, and further, as being due to inherent forces, or ciliary action of the vaginal mucous membrane.

Dr Underhill remarked that a good many cases had been recorded where pregnancy had taken place without rupture of the hymen. He had seen more than one himself. The hymen differed very much in structure in different women, being sometimes thick and tough, and not easily torn, and in others thin and sharp; and it was in women with thick, dilatable hymens that this was most apt to occur. He had seen a case under the care of Dr Matthews Duncan where pregnancy occurred through a minute hole, just large enough to admit a surgical probe, which had been left after the whole vaginal orifice had been sewn up in consequence of very severe tearing and sloughing from a difficult and badly-managed labour. It was probable that the uterus was pushed down nearer the vaginal orifice during coition, and that the abdomen possessed some aspiratory force tending to suck up the seminal fluid. Ciliary movement could have nothing to do with it, as there were no cilia on the vaginal mucous membrane. Such cases as Dr Campbell's taught us to be very chary in accepting any statement of the patient's when there was a question of pregnancy at issue.

Dr J. W. Ballantyne remarked that this case was another example of the exception to the old rule, that the existence of the hymen was a sign of virginity. Many similar cases were to be found recorded in the text-books on Medical Jurisprudence. Great care required to be exercised before a definite statement with regard to virginity could be made.

V. THE RELATIONS OF THE PELVIC VISCERA IN THE INFANT.

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In January 1886, Dr Johnson Symington read before this Society a very valuable paper on "The Position of the Uterus and Ovaries in the Child," in which he succeeded, by the aid of frozen sections, in giving a much clearer conception of the relations of these viscera in the child than is to be obtained from the study of most text-books on anatomy. It is my intention in this communication to lay before this Society some observations upon the relations of the pelvic viscera as they exist in the new-born infant. The conclusions to which I have been led are founded upon the examination by the frozen sectional method of seven full-time infants, four male and three female, and of one six-months' male fœtus. The infants were, with one exception, placed upon the back during the freezing process, and sections were made and drawings obtained in the usual manner. In seven out of the eight cases there were no naked eye pathological conditions in the pelvis; but in one of the full-time female infants there was abdominal and pelvic peritonitis, and, as will be seen, this condition had led to a change in the normal relations of the tubes and ovaries.

In the new-born infant the bladder, the Fallopian tubes, the ovaries, and part of the body of the uterus cannot with strict accuracy be spoken of as pelvic viscera, for they lie above the plane of the pelvic brim; but as the child grows and the pelvis enlarges, these organs descend below the brim, and it is convenient for descriptive purposes to apply the term "pelvic" to these structures as well as to the rectum, cervix uteri, vagina, and urethra. The relations of the pelvic viscera in the infant are greatly influenced by the form and dimensions of the bony pelvis at birth, and it is therefore necessary to state briefly the characters of that part of the infant's skeleton.

The sacrum, which in the fœtal state is quite straight, is very nearly so in the infant at birth, having only a small anterior concavity. The wings of the sacrum also are slightly developed, and hence the length of the bone is greater than its breadth. From several measurements I find the length of the sacrum to be on an average 2·7 ctms., and the average breadth to be 2·0 ctms.; thus the sacral index in the new-born infant is 76, and the sacrum, therefore, is markedly dolichohieric. In the adult, on account of the relatively large size of the sacral alæ, the platyhieric condition is arrived at, the sacral index being 112. The sacrum in the

infant, therefore, resembles that bone in the bush Kaffir, in the Andamanese, in some Australian tribes, and also in the higher apes. The promontory of the sacrum is feebly developed at birth. The iliac bones, also, have in the infant an almost inappreciable anterior concavity, and the iliac fossæ can scarcely be said to exist. The angle of divarication of the ilia is much greater at birth than in adult life. Cleland gives 86° as the angle of divarication at birth as compared with 50°·5 in the adult female, and 53° in the adult male skeleton. The following were the measurements of the interspinous and intercristal diameters in six infants' pelves:—

	Interspinous diameter.	Intercristal diameter.		Interspinous diameter.	Intercristal diameter.
Case 1,	6·2 ctms.	6·3 ctms.	Case 4,	4·8 ctms,	5·3 ctms.
„ 2,	5·5 „	6·0 „	„ 5,	5·5 „	6·0 „
„ 3,	4·8 „	5·2 „	„ 6,	4·9 „	5·4 „

In the adult female the average measurement of the interspinous diameter is 23 ctms., whilst that of the intercristal diameter is 25·5 ctms.

The rami of the pubic bones are stumpy, and, therefore, the symphysis is short. The primary ossific centres are present in the innominate bones, but they are separated by cartilage, and the acetabulum is principally cartilaginous.

The pelvis, as a whole, differs markedly from the adult condition. Superficial inspection is sufficient to show that the pelvic canal has a different form when compared with its form in the full-grown pelvis. The canal is somewhat funnel-shaped, and the pelvic brim is very oblique to the horizon. The greater obliquity of the pelvis in the infant is seen in the relation which the promontory of the sacrum bears to the symphysis pubis. The promontory is situated at a much higher level as regards the symphysis in the infant than in the adult, and, therefore, the plane of the brim comes to run nearly perpendicularly to the horizon. On the other hand, a line drawn from the lower border of the symphysis pubis to the tip of the coccyx runs very nearly parallel to the horizon, and this fact demonstrates the absence of obliquity in the plane of the pelvic outlet.

Varying statements have been made with regard to the length of the various pelvic diameters in the infant. It is evident at a glance that the distance between the promontory of the sacrum and the upper border of the symphysis pubis (the conjugata vera) is greater than either the transverse or oblique diameters of the pelvic brim. In the adult pelvis, on the other hand, the conjugata vera is less than either the transverse or the oblique diameters of the inlet. In the infant the conjugata vera has an average length of 3·5 ctms., whilst the transverse diameter at the brim measures about 2·5 ctms.; in the adult female pelvis the conjugata vera

measures about 10 ctms., and the transverse about 12·5 ctms. In the infant, therefore, the brim of the pelvis is longer in an antero-posterior than in a transverse direction, whilst in the adult the transverse diameter at the brim exceeds the antero-posterior. It has, however, been pointed out that the conjugata vera in the infant does not truly represent the antero-posterior diameter of the pelvic brim, and that the true pelvic inlet is bounded posteriorly by the body of the 3rd, instead of that of the 1st, sacral vertebra. A line drawn from the upper part of the body of the 3rd sacral vertebra to the upper border of the symphysis pubis may be taken as representing the antero-posterior diameter of the brim, and this diameter has been called the conjugata vera inferior. Balandin, Fehling, Litzmann, and Veit, to whom we are indebted for most elaborate statistics of the pelvic diameters in the infant, take the conjugata inferior, and not the conjugata superior, as the antero-posterior diameter with which the transverse and oblique diameters at the inlet may be most usefully compared. I have measured the pelvic diameters in the case of six infantile pelves, and the results of these measurements are embodied in the following table:—

	I.	II.	III.	IV.	V.	VI.
Length of infant,	39 ctms.	42 ctms.	40 ctms.	42·5 ctms.	40 ctms.	42 ctms.
Conjugata superior,	3 „	3·6 „	3·1 „	3·8 „	2·9 „	3·4 „
Conjugata inferior,	2·1 „	2·6 „	2·6 „	3·0 „	2·0 „	3·0 „
Transverse diameter,	2·7 „	2·2 „	2·3 „	2·5 „	2·5 „	2·0 „
Oblique diameter,	2·5 „	3·1 „	2·5 „	3·0 „	2·6 „	3·1 „
Distance between ischial spines,	2·0 „	1·7 „	1·8 „	1·8 „	2·3 „	1·6 „
Antero-posterior diameter of outlet,	1·5 „	2·0 „	1·5 „	1·6 „	1·8 „	2·4 „
Distance between ischial tubers,	1·8 „	1·5 „	2·0 „	2·0 „	2·0 „	1·7 „

The smallest child measured 39 ctms. in length, and the largest 42·5 ctms. The average lengths of the diameters as obtained from the above table are as follow:—

Diameter conjugata superior, . .	= 3·3 ctms.
Diameter conjugata inferior, . .	= 2·55 „
Diameter transversa (at brim), . .	= 2·36 „
Diameter obliqua (at brim), . .	= 2·80 „
Distance between ischial spines, . .	= 1·86 „
Antero-posterior diameter (at outlet), .	= 1·80 „
Distance between tuberosities of ischium,	= 1·96 „

The above figures represent the absolute lengths of the diameters; in the following table I have placed side by side the relative lengths of the diameters obtained by Balandin and by myself in the new-born infant, and by Litzmann in the adult female. The conjugata vera is represented by 100.

	Balandin, 14 pelves.	Ballantyne, 6 pelves.	Litzmann, in adult pelvis.
Conjugata vera, . .	100	100	100
Transversa at brim, . .	105	92	129
Obliqua at brim, . .	108	109	120
Distance between ischial spines,	75	72	96
Antero-posterior at outlet,	92	70	119
Distance between ischial tuberosities, . . .	73	76	115

From the study of the foregoing table it will be seen that my figures agree with those of Balandin in showing that in the infant the longest pelvic diameter at the brim (leaving out of account the conjugata superior) is the oblique; but they differ in the fact that whilst Balandin gives the antero-posterior diameter as the shortest, my measurements would seem to show that the transverse is the shortest brim diameter. In the adult female pelvis, as every obstetrician knows, the shortest diameter at the brim is the antero-posterior, the longest is the transverse, whilst the oblique occupies an intermediate position. With regard to the distance between the ischial spines and that between the ischial tuberosities in the infant, my results tally with those of Balandin; but as regards the antero-posterior diameter of the outlet, my figures are larger than those obtained by Balandin. In the adult the three above-named diameters are all greatly increased in their relative length, showing the extent to which the lower part of the pelvis opens up in the adult. In the adult female pelvis, therefore, the ischial tuberosities and the ischial spines are much more widely separated than in the infant, and the separation of the tuberosities is relatively greater than that of the spines.

Such being the characters of the pelvis in the infant, it is easy to understand how several of the viscera which are pelvic in position in the adult come to lie above the brim of the pelvis at the time of birth. The bladder, rectum, and the uterus and annexa may now be conveniently studied in detail.

The Bladder.—Symington, in his work upon the *Topographical Anatomy of the Child*, states that the description of the bladder in the new-born infant given in the text-books of anatomy is meagre, unsatisfactory, and even inaccurate, and with this statement I can fully concur.

Position of the Bladder.—The bladder of the infant is even when fully distended almost entirely an abdominal organ. In the six months' fœtus, a male, the bladder, which was distended with clear, pale-yellow urine, lay, as will be seen in the drawing of the sagittal mesial section of the pelvis (*vide* Plate, Fig. 1), almost entirely above the pelvic brim, only a small part of the lower and posterior segment lying below that plane. In the case of a full-time male infant (Fig. 2), in which the bladder was very greatly distended with

urine, a still smaller part of the lower end of the viscus lay below the pelvic brim, in the plane of which lay the vesical openings of the ureters. In this specimen the section passes slightly to the right of the middle line, for it cuts through the right ureter at its point of entrance into the bladder. In the case of another full-time male infant (Fig. 3), in which the bladder was only partially filled with urine, the same relation of that viscus to the plane of the brim was found to exist. In this case the whole bladder cavity is not laid open, as the section was made considerably to the right of the middle line of the body. In the cases of three full-time female infants (Fig. 4), in all of which the bladder was empty, an almost inappreciable part of the vesical cavity lay below the plane of the brim. Symington states that fully half the bladder in the infant lies within the cavity of the true pelvis and below the plane of the brim. The specimens above mentioned do not show this disposition of the bladder, but in three of the cases (two male and one female) there existed a circumstance which may serve to explain the difference in position of the bladder. This circumstance consisted in the presence of a loop of the lower end of the descending colon or of the upper end of the sigmoid flexure within the pelvic cavity, lying in the female infant in the right part of the utero-rectal pouch, and in the male infants in the recto-vesical pouch. In the other female infants the bladder was empty, and was not therefore distended at its lower end; and it must not be forgotten that in them there lay part of the *uterus* within the pelvic brim. In the case which Symington figures in his *Atlas* (p. 68), in which half the bladder lay in the pelvis, the infant was a male, therefore there was no uterus to fill up the brim, the bladder also was distended, and bulged backwards towards the sacrum; and further, there was no loop of sigmoid flexure in the pelvis, the posterior vesical wall lying in contact with the rectum, and the recto-vesical pouch being empty. If the pelvis contain in addition to the rectum a twist of sigmoid flexure, and more especially if the subject be a female, it is difficult to see where room can be found within the pelvis for fully half the bladder. The arrangement of sigmoid flexure to which I have above alluded is, I believe, a very common one in the infant, and I find that Jacobi (*Archives of Pediatrics*, 1888, p. 204) makes the statement that "the sigmoid flexure is bent upon itself several times in the narrow pelvis of the infant." In the case of male infants in whom no loop of sigmoid flexure exists in the pelvis, and in which the bladder is distended, that organ may be found lying to some extent below the plane of the brim; but in the female infant, where the uterus partly fills up the brim, and in male infants, where the sigmoid twist occupies the pelvic inlet, the above-described position of the bladder must be the usual one. The bladder is, therefore, practically entirely an abdominal organ at birth.

In my specimens the vesical orifice of the urethra lay very nearly at the level of the upper border of the symphysis pubis, and in all only a very small part of the vesical cavity lay behind a line dropt vertically through the orifice of the urethra. The position of the upper end of the bladder varies with the state of distension of the viscus. Of three cases in which the bladder was empty, in two its upper end lay 2·3 ctms. above the symphysis pubis, and in the other case (in which the infant was frozen in the genu-pectoral position) it lay 3 ctms. above the level of the symphysis. In one case in which the bladder contained a little urine, its upper end was 2·5 ctms. above the symphysis; and in another case in which the bladder was enormously distended, its upper margin was found 2 mms. above the umbilicus (4·5 ctms. above the symphysis). It is probable that the empty bladder in the infant reaches nearly half way to the umbilicus.

The Form of the Bladder.—The bladder of the infant is often described as pyriform in shape, with the larger end superior; but frozen sections have clearly shown that except in cases of over-distension this is not the normal form of the viscus. In the cases in which the bladder was quite empty, its cavity was seen to form a continuation of the urethral canal, and the anterior and posterior walls were in complete apposition. In one of Symington's cases (fig. 27 in his *Atlas*) the bladder, which contained about 1 drachm of urine, is seen to have an egg shape, the larger end of the ovoid being directed downwards and backwards, and in one of my cases (Fig. 3), in which the bladder contained a few drops of urine, the viscus is seen to have a somewhat triangular form, the base being below and the apex above. In this case there was a very small vesical cavity, but even with this small cavity it could be clearly seen that the larger portion of the cavity was situated inferiorly and not superiorly. In the six months' fœtus the bladder, which was pretty well filled, had a somewhat ovoid form, but there was no great difference in the size of its two poles. In another case (Fig. 2), the bladder was over-distended, reaching above the umbilicus, and in this solitary instance the upper end of the bladder cavity was larger than the lower. It may be concluded that the normal form of the partially distended bladder is ovoid, and that, as Symington states, the larger end is directed downwards and slightly backwards. The rugæ on the bladder walls are well seen in the empty bladder, and in the partially filled organ these are present only at the upper end, whilst in the fully distended viscus these are absent altogether. It is easy to conceive that as urine begins to dribble into the empty bladder, it will first accumulate at the lower end of the organ, and there separate the walls and smooth out the rugæ; and that as the distension becomes more marked, the upper part of the bladder will also become distended, and the rugæ will disappear both at the upper and lower extremities of the viscus. The important fact with regard to the form of

the bladder in the infant is, that the broad end is directed downwards.

The Relations of the Bladder.—In the infant the anterior vesical wall is in close contact with the anterior abdominal wall, and there is no intervening pouch of peritoneum. The reflection of the peritoneum from the anterior abdominal wall on to the posterior bladder wall usually takes place a little below the level of the umbilicus, and from 2 to 3 ctms. above the upper border of the symphysis pubis. In one case in which the bladder was over-distended, the peritoneum passed to the posterior surface of the bladder about the level of the umbilicus. The anterior surface of the bladder, triangular in shape, is, therefore, entirely uncovered by peritoneum, a fact of great importance to the surgeon who may be contemplating operative interference for stone. Posteriorly the peritoneum passes over the bladder wall, reaching in the male infant to a point immediately below the vesical orifice, and here coming into relation with the small prostate gland, another fact which is of great importance surgically. In the female infant the peritoneum does not descend so low posteriorly, for its point of reflection on to the anterior uterine wall lies above the level of the internal urethral orifice. In the infant the posterior relations of the bladder are less constant than are its anterior relations. In one male infant the bladder was related posteriorly to a loop of sigmoid flexure, and to the commencement of the rectum; in another the anterior surface of the cæcum was in relation with the posterior vesical wall, but in this case the cæcum lay mesially, and was therefore abnormal in position; in a male fœtus of six months the bladder was related posteriorly to the rectum and to some coils of small intestine; and in yet another premature infant with dropsy, the posterior bladder was in contact with ascitic fluid which lay in the recto-vesical pouch of peritoneum. In the female infants the bladder lay in close relationship with the uterus posteriorly, but in one case there intervened a loop or two of small intestine, which lay in the utero-vesical pouch of peritoneum, and in this case also the right Fallopian tube lay behind and a little to the right side of the bladder, being also in the utero-vesical pouch. The hypogastric arteries run laterally to the bladder, converging towards the umbilicus.

The Size of the Bladder.—The bladder is relatively small in infants, and this fact is at least one of the causes of the frequency of micturition in infants and young children. When empty the cavity of the organ measures from 2 to 2·5 ctms. in length; but that the bladder can in exceptional circumstances be greatly distended with urine is proved by one of my cases in which its upper wall reached to a point 1 or 2 millimeters above the umbilicus. It is rare for the bladder to contain more than 1 drachm or $1\frac{1}{2}$ drachms of urine at a time at birth.

The Urethra.—In the female infant the urethra is pelvic in

position, and runs at first downwards parallel to the axis of the pelvic canal, it then turns slightly forwards and ends at the meatus urinarius externus, about 1 ctm. in front of a line drawn vertically downwards from the lower border of the symphysis pubis. Dr Symington has demonstrated that in the young female chimpanzee the meatus urinarius lies behind a line drawn vertically downwards from the symphysis. There is no approach to this condition seen in the human female infant. The length of the urethral canal alone is about 4 ctms. in the female, and a little more than 6 ctms. in the male infant. I have passed a No. 10 catheter with ease through the infantile urethra.

The Ureters.—In two cases I traced the course of the ureters by injecting them with quicksilver. They lie immediately internal to the external and internal iliac vessels at the brim of the vessels, and dip down under the broad ligaments close to the sides of the uterus, and rise again slightly to open into the bladder at or immediately above the plane of the brim.

The Rectum.—The relations of the rectum may now be considered. This part of the intestinal canal is relatively larger and more vertically placed in the infant than in the adult. Its large size and vertical position are taken advantage of by the physician, who often finds it useful to take the infant's temperature by means of the thermometer passed into the rectum. It is also probable that the rectum may come to be more generally employed in diseases of infancy for the purposes of alimentation by nutritive enemata than it has hitherto been. The rectum in the infant may, as in the adult, be divided into three portions. The first part is nearly quite vertical, and passes down in front of the sacrum to the lower part of that bone, where it turns slightly forwards to become continuous with the second part. If the first part of the rectum be empty as in one of my cases where the infant lived for six days, it frequently forms one or two lateral bends; but if it be distended with meconium, as in the other infants observed, this part of the bowel is nearly quite straight. The second part is very short in the infant and runs downwards and forwards. The third part is relatively long, and passes downwards and slightly backwards to terminate at the anus. This part of the intestine is, therefore, more worthy of its name, *rectum*, in the infant than in the adult, where it is far from being a straight tube. Its straightness, large size, and vertical position may have not a little effect in favouring the production of prolapsus recti, a common malady in the infant, and the rational treatment of this disease will, therefore, be to use palliative measures until the infantile disposition of the rectum becomes changed into the adult. The pritoneum descends in both male and female infants in front of the rectum to about the level of the fourth sacral vertebra posteriorly, and to that of the middle of the symphysis pubis anteriorly. Posteriorly the rectum is in contact with the anterior surface of

the sacrum and coccyx, and has in the upper part of its course a meso-rectum.

The Sigmoid Flexure in the Pelvis.—It may be well here to restate the fact that in several of the infants examined a loop of the sigmoid flexure formed one of the pelvic contents. In the male infants it lay in the middle line or a little to the right of it; between the rectum and bladder in the recto-vesical pouch, and in one female infant it lay in the right compartment of the pouch of Douglas behind the right broad ligament.

The Anus.—The anus in the infant is directed downwards and slightly backwards. On account of the small degree of development of the gluteal regions in the infant, the anus does not lie in a depression between the buttocks as it does in the adult. A recognition of this anatomical fact would tend to save many a one from the rather humiliating position of having failed to diagnose a breech presentation. A peculiarity pointed out by Symington is, that a line dropped vertically from the tip of the coccyx will pass through the anal aperture, and this fact I was able to demonstrate in several of the sections made. In the infant, therefore, the anus is situated relatively posterior to the position it occupies in the adult.

The Uterus.—The uterus differs in many points from that organ in the adult, and there also exists considerable difference of opinion as to what are the normal topographical relations of the infantile uterus. I have studied the uterus in the new-born infant in three cases by the frozen sectional method, and in many other cases by simple dissection, and have compared the results thus obtained with the conclusions of Boullard, Bandl, Klob, Kolliker, and Symington.

Position of the Uterus.—The uterus at birth is partly an abdominal and partly a pelvic organ. In the three full-time infants examined by the frozen sectional method, the proportion of the entire length of the uterus which lay above the pelvic brim varied from a little more than one-third to nearly a-half. In one of Symington's sections (*Trans. Ed. Obst. Soc.*, vol. xi. p. 36), the proportion of uterus lying above the pelvic inlet is less than one-third. It is probable that the proportion of the uterine mass which lies in the abdomen varies considerably in individual cases, and is influenced to some extent by the condition of the adjacent intestine. In the new-born infant the rectum and sigmoid flexure are distended with meconium, and this may serve partly to explain the high position of the uterus in the cases which are noted above.

With regard to the relation of the uterus to the horizon, and of the body of the uterus to the cervix, authorities are at variance. Most writers assert that the uterus is normally anteverted, and some hold that it is also slightly anteflexed, whilst others believe that it is sometimes straight. I do not think that one position can be assigned to the infantile uterus as the normal; in my three cases, in all of

which the rectum was distended and the bladder empty, the uterus lay in an anteverted position; but had the conditions been different—had the bladder been distended and the rectum been empty —the uterus would, no doubt, have occupied a nearly vertical position. I have not seen the organ anteflexed, although it may occur; and with regard to retroflexion there seems to be no doubt that such a position is in the infant always pathological, and, indeed, its occurrence is very rare, almost the only cases recorded being two noted by Ruge ("Zwei Fälle von Retroflexio Uteri bei Neugebornen," *Zeitschr. f. Geburtsh. und Gyn.*, Bd. ii., p. 24), in both of which the uterus was abnormal in structure. The presence of the rectum filled with meconium, and of the loop of sigmoid flexure, will tend very much to keep the uterus in a position of anteversion, and, as above stated, I look upon the vertical position and the position of anteversion as representing the normal lie of the uterus in the new-born infant. If the bladder be distended, the uterus will be more or less vertical; if undistended, it will be anteverted in position.

In one of the cases examined there was, in addition to the anteversion, a slight degree of torsion of the uterus. The anterior surface faced towards the front and the left in such a manner that the uterine end of the right Fallopian tube lay anterior to the uterine end of the left tube. In this case a loop of sigmoid flexure occupied the right compartment of the pouch of Douglas, and being distended with meconium, may by its pressure have caused the torsion of the uterus. The adult uterus has also in its normal position this slight degree of torsion, but, as is well known, in pregnancy there is in the great majority of cases torsion in the opposite direction, so that the anterior surface of the uterus faces to the front and to the right side. The torsion in pregnancy is usually ascribed to the presence of the rectum on the left side, and it is reasonable to suppose that the primitive twisting of the uterus seen in this case and in the adult *unimpregnated* uterus may be due to the presence of sigmoid flexure in the right side of the pelvic cavity in the pouch of Douglas.

Size of the Uterus.—In the infant, as is well known, the cervix uteri is relatively much larger, both in length and thickness, than the body of the organ. The average length of the uterus in the new-born infant is usually placed at 2·5 ctms., but in nearly all the cases I have examined I found this measurement exceeded. In one case the uterus measured 3·2 ctms. in length; in another infant the measurement was as much as 4·1 ctms., and even in a seven and a half months' infant the uterus was found to be 2·7 ctms. in length. In the case of four uteri from new-born infants measured by Symington, in two the length was 2·5 ctms., in one it was 2·6 ctms., and in one it was 3·0 ctms. In the following table are given the average measurements obtained from the examination of the uterus in four infants:—

Length of uterus from anterior lip of cervix to fundus,	3·4 ctms.
Sound passes in to a distance of	3·2 „
Transverse diameter at fundus uteri, . . .	1·1 „
Antero-posterior „ „ „ „ . . .	0·8 „
Thickness of wall „ „ „ . . .	0·2 „
Antero-posterior diameter of cervix uteri, . .	0·9 „
Transverse „ „ „ . .	1·25 „

The above table shows that in these infants the cervix uteri was larger both in the antero-posterior and in the transverse direction than was the fundus uteri, but the difference was not so large as might have been expected from the statements made by some authors. No doubt there are considerable individual differences depending upon the size of the infant, etc. It was also noted that, as a rule, the anterior lip of the cervix was very slightly longer than the posterior; but in one case the two lips were of practically the same length. The gaping condition of the os uteri was a notable character of all the uteri I examined, and in all of them the folds of the arbor vitæ were prolonged to the fundus. There was one longitudinal fold on the posterior wall which extended from os externum uteri to fundus; in the lower part of the uterus there were also many transverse folds, while near the fundus the folds ran in an oblique direction. On the vaginal aspect of the cervix some rugæ were usually seen, but only on the anterior lip. Posteriorly the peritoneum descended behind the uterus to a level one or two millimeters below that of the os externum, whilst anteriorly it descended to a point almost exactly half-way between fundus and os externum uteri.

The Fallopian Tubes.—The Fallopian tubes in the new-born infant have an average length of from 2 to 3 ctms., and the right tube is usually a little longer than the left. There are at birth from three to five sinuosities on each tube, but in the fœtus at an earlier period of intra-uterine life these are more numerous, and are found at the uterine end of the tube as well as more peripherally (Fig. 5). Freund points out how the sinuosities disappear from the uterine end of the tube first, and he attaches considerable importance to their presence in adult life as an etiological factor in the production of hydro- or hæmato-salpinx.

The position and direction of the Fallopian tubes were ascertained by allowing the frozen sections to thaw partially, and by then removing the coils of small intestine which lay in front of the uterine appendages. In two cases which were treated in this way the tubes were seen to have a general direction outwards, backwards, and downwards. The downward direction of the tubes is due to the fact that the uterine fundus lies above the plane of the brim. The uterine end and inner third of the tube lie at the level of the fifth lumbar vertebra above the brim of the pelvis, whilst the fimbriated end lies at or below the plane of the brim. In one

case there was peritonitis in the new-born infant, and in this case the tubes and ovaries were both firmly adherent to intestinal coils to the cæcum on the right side and to the sigmoid flexure on the left; in this case also the tubes had a general upward direction, the result evidently of the peritonitic adhesions.

The Ovaries.—In the infant the ovaries lie in a somewhat vertical position, near to the uterine fundus and behind the Fallopian tube of that side. What is usually described as the outer end of the ovary is seen projecting upwards above the Fallopian tube, and the long axis of the ovary runs from above downwards and inwards. The surfaces of the ovary usually termed anterior and posterior are internal and external in the infant, and the borders are anterior and posterior. In one case, that in which there was a degree of lateral twisting of the uterus, the right ovary lay anterior to the uterus, and the left in a plane somewhat posterior to it; but as to the frequency of this arrangement I can make no definite statement. Since the ovaries lie above the plane of the brim, and since the broad ligaments are not at all tense in the infant, it is probable that both ovary and tube may occupy positions other than those described. It is difficult to lay down with any degree of definiteness their normal position at birth.

The Vagina.—In the new-born infant the vaginal canal is relatively long, and in the first part of its course it runs almost vertically downwards, it then changes its direction, and passes downwards and slightly forwards to end at the hymen. It does not, therefore, as in the adult, run upwards and backwards in a direction nearly parallel to the plane of the brim, but is in the infant more nearly parallel to the axes of the rectum and urethra. It forms with the uterus a very obtuse angle. The vagina varies in length from 2·5 to 3·5 ctms., and I have not noted any difference in the depth of the anterior and posterior fornices. Its form on section somewhat resembles an H, the anterior and posterior walls being nearly in close contact in the middle line. The vaginal walls are covered with numerous transverse rugæ.

The statements made in the preceding pages are founded in great measure upon a thesis on "Certain Anatomical and Pathological Conditions in the Fœtus and Infant at Birth," for which the Gunning-Simpson Prize and a gold medal were awarded in 1889; but I have supplemented the material which I then possessed by frozen sections of three additional new-born infants —two male and one female.

Description of Plate.

Fig. 1.—Vertical sagittal section of pelvic region in six months male fœtus. *a*, 1st sacral vertebra; *b*, coccyx; *c*, rectum; *d*, bladder, distended with urine; *e*, umbilical cord; *f*, coils of large intestine; *g*, filum terminale of spinal cord; *h*, pubic bone.

Fig. 2.—Vertical sagittal section of pelvic region of full-time male

infant (section slightly to right of middle line anteriorly). *a*, anal aperture ; *b*, bladder, greatly distended with urine ; *c*, opening of left ureter ; *d*, vesical trigone ; *e*, loop of sigmoid flexure in pelvis ; *f*, rectum ; *g*, coccyx ; *h*, 3rd sacral vertebra ; *i*, prostate gland.

Fig. 3.—Vertical sagittal section of pelvic region of full-time male infant (still-born). Section is to the right side of the middle line. *a*, umbilical cord ; *b*, partially filled bladder ; *c*, cæcum and ileo-cæcal valve ; *d*, loop of sigmoid flexure in pelvic cavity ; *e*, pubic bone ; *f*, scrotum and right testicle ; *g*, urachus ; *h*, penis.

Fig. 4.—Vertical sagittal section of pelvic region of full-time female infant (frozen in genu-pectoral position). *a*, coccyx ; *b*, 1st sacral vertebra ; *c*, body of uterus ; *d*, cervix uteri ; *e*, vagina ; *f*, empty bladder ; *g*, symphysis pubis ; *h*, right ovary and Fallopian tube ; *i*, rectum ; *k*, anal aperture.

Fig. 5.—Dissectional view of pelvic viscera in six months fœtus (from above and from the front). *a*, bladder ; *b*, fundus uteri ; *c*, left Fallopian tube, showing tortuosities ; *d*, left ovary ; *e*, rectum.

Dr Underhill said the Society were greatly indebted to Dr Ballantyne for such an elaborate and laborious paper. It was not easy to criticise it, as few of them had given any special attention to the special pelvic anatomy of the infant. He could corroborate the statement that in infants the right corner of the uterus was sometimes pushed forward, probably by the coil of sigmoid flexure behind it, as he had made a similar observation some years ago, and there were several points brought out which would prove useful in practice, —the abdominal position of the bladder, the size of the rectum, and the high point in the abdomen at which the peritoneum was reflected on to the bladder in infants. He would like to know what ground Dr Ballantyne had for assuming that the full bladder in the seventh month fœtus was dependent on hæmorrhage into the placenta. He could not trace the connexion.

Dr Church referred to the importance clinically of remembering that in the infant the pelvic viscera, as also the other viscera of the body, had not quite the same relation as in adult age. Apropos of this was the subject of constipation, which the physician was so often called upon to treat during the early months of the child's life, a condition disappearing when the child began to walk. Dr Ballantyne had pointed out in his paper, and illustrated in his beautiful diagrams, the common occurrence of the sigmoid flexure being situated in the brim of the pelvis, or even in the pelvic cavity, as well as lateral bendings which were sometimes met with in the rectum in its descent. It seemed very probable that such constipation might be due to pressure from or distension of the sigmoid flexure against the rectum, as well as from lateral flexures in the rectum itself. For when the child got upon its feet when about a year old, the constipation disappeared, probably because there was to some extent induced the relative position of the rectum and sigmoid as we find it in adult life. The weight of the body in walking would also render the inlet into the pelvis more horizontal, the perpendicular aspect of the inlet in the infant being

Fig 1

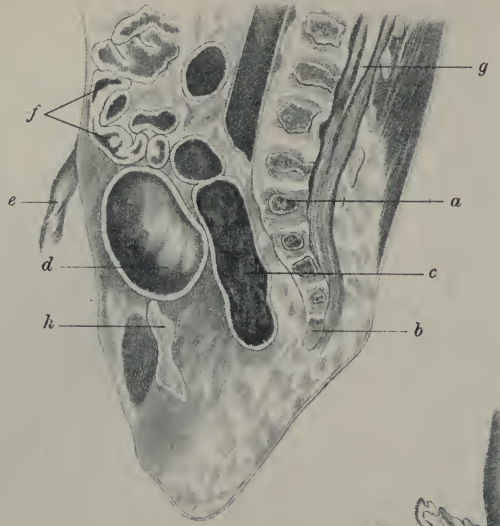

Fig 2

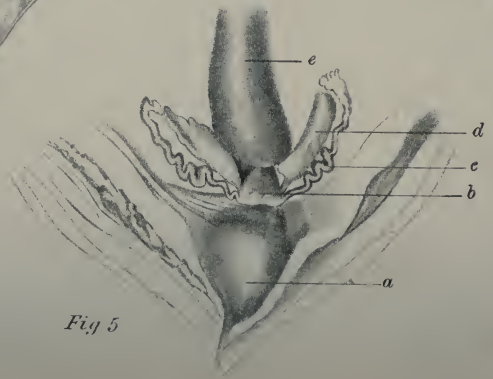

Fig 5

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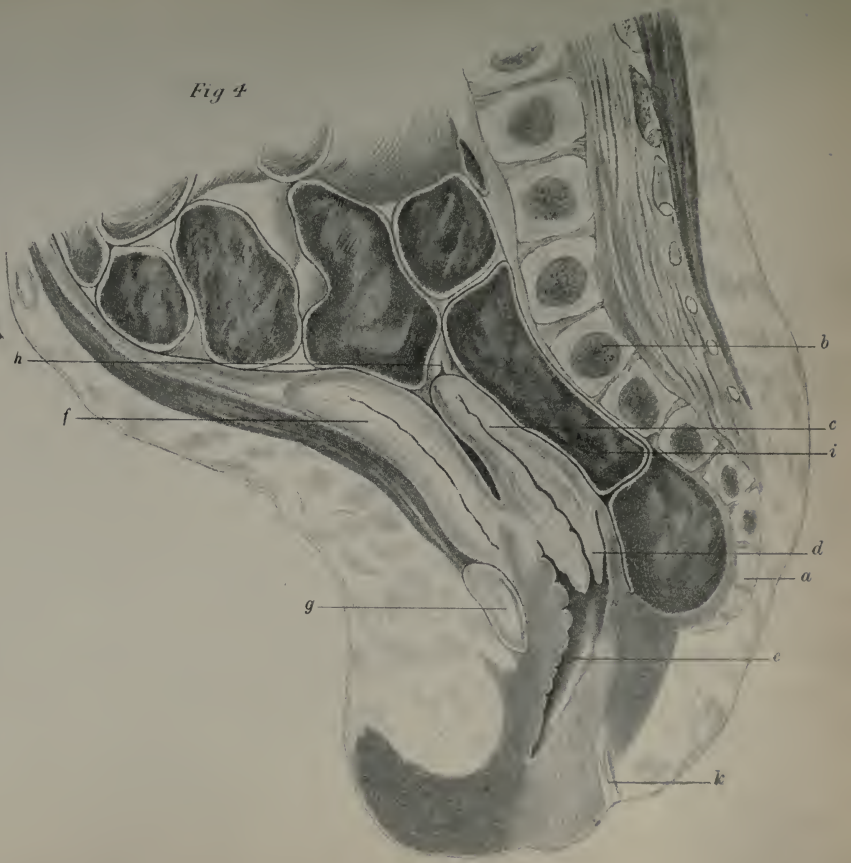
Fig 3

Fig 4



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an additional anatomical factor in the production of the constipation in the class of cases under consideration. Dr Church also referred to the beautiful mechanism of the backward direction of the anus and lower end of the rectum, but thought it as much present in the adult as in the infant.

Dr Fraser Wright had listened with great pleasure and profit to Dr Ballantyne's paper. But he had not been able quite to understand what Dr Ballantyne meant by the pelvic brim in the new-born infant. He wished to ask whether in the series of observations and measurements just recorded the brim was taken as being at the level of the promontory or at the level of the third sacral vertebra. He did not agree with Dr Ballantyne in thinking that the case just recorded, where the uterus was rotated to the left apparently by a knuckle of bowel, offered any reason for supposing that the pregnant uterus might be rotated (as it generally was) to the right by the sigmoid flexure. For although the former was very probable, owing to the relative size of the infantile bowel and uterus, yet the latter, owing to the insignificant size of the sigmoid flexure compared with the pregnant uterus, could not at all be the likely cause of the torsion. It did not in the least support this theory of the torsion of the pregnant uterus. Nor did he think (as the President had just remarked) that Dr Ballantyne was warranted in assuming the secretion of urine in the fœtus he had observed to be due to the placental hæmorrhage which co-existed, and just as likely as not were merely accidentally associated.

Dr Ballantyne thanked the Society for the kind reception given to his paper. He would answer the criticisms seriatim. In reply to Dr Underhill, it was quite true that it was an assumption to state that the full bladder in the six months' fœtus was due to the placental hæmorrhage; but in his opinion the evidence was strong, there was accidental hæmorrhage before the child was born, therefore the functions of the placenta were interfered with, the excretory function amongst others, and so the kidneys were stimulated to secrete the urine. In reply to Dr Church, Dr Ballantyne said that constipation in infants due to the anatomical relations of the larger intestine in the pelvis was not unknown, and had been called "anatomical constipation;" no doubt this was the explanation of some obscure cases of constipation in early life. With regard to the rotation of the gravid uterus, he quite agreed with Dr Fraser Wright that its cause was not certainly ascertained, but if it were true that in the infant the torsion of the uterus was caused by a coil of intestine, it was the more likely that a similar cause might be in operation in the pregnant woman, for in pregnancy, as in infancy, the uterus lay partly above the plane of the brim. In speaking of the plane of the brim, Dr Ballantyne meant the imaginary surface, bounded posteriorly by the promontory of the sacrum,—he had only employed the conjugate inferior for the purpose of comparing together the brim diameters.

Meeting VII.—May 14, 1890.

Dr Berry Hart, *President, in the Chair.*

I. *Dr James Carmichael* exhibited APPARATUS FOR THE STERILISATION OF MILK, and described the methods of Soxhlet and Roch, and also the steriliser of Arnold. He remarked that one of the greatest improvements of recent years in the treatment of cow's milk in the artificial feeding of infants was sterilisation. It had been noticed as a curious fact that formerly, and previous to the introduction of this method, hand-fed infants were the only individuals who were reared on unsterilised food, that of older children and adults being invariably cooked. The profession, having now become alive to this fact, are generally agreed as to the necessity of cooking milk as well as other foods. It is perhaps hardly necessary to allude to the fact, that under normal conditions the infant receives from the mother's breast a perfectly aseptic fluid so far as any injurious or pathogenous organisms are concerned. It is therefore incumbent on us, in our endeavour to follow Nature as closely as possible, to see that the cow's milk is rendered aseptic—and this can be done with very little care and trouble. The investigations of all the leading bacteriologists, such as Pasteur, Lister, Loeffler, Hueppe, and others, have shown that cow's milk is one of the best pabula for the development of micro-organisms. Escherich has shown in his essay on the "Pediatrics of the Naturforscherversammlung" that within a few hours of milking there are over a million of germs in the milk. The absolute necessity, nay, the culpability of the neglect of complete sterilisation of cow's milk before administration must be admitted. The practice is in general use on the Continent and America, yet it can hardly be said to have been introduced in Great Britain. No doubt we have hitherto in this country been in the habit of recommending milk to be boiled in an ordinary open pan, but this is quite useless so far as efficient sterilisation is concerned. The apparatus now in use, such as has been exhibited to the Society, is the most efficient and ready one at present at our disposal, yet by their means complete sterilisation is not effected, for according to Pasteur and Lister a temperature of 266° is required to effect thorough sterilisation of the milk, and to destroy the spores as well as the micro-organisms themselves. Nevertheless it is believed that the methods now in use are sufficient for practical purposes to render the milk innocuous. Milk sterilised in Soxhlet's apparatus for forty-five minutes will keep for three days; if boiled for one and a-half hours, it will keep six weeks. At the temperature of boiling water or steam, it is admitted that most if not all the organisms are destroyed, leaving the spores, and it is found in practice that the milk so treated is wholesome and safe for administration. The results obtained, both on the Continent and in America, have been most

satisfactory, and a large reduction in infantile mortality under bottle feeding has been effected. It cannot be doubted that before long the practice of efficient sterilisation of milk, whether for bottle babies or household use, will become general in this country, and it is with the view of pressing this matter on the profession that I have ventured to bring it before the Society to night.

II. *Dr J. D. Williams* showed a series of SIX COLOURED CASTS, prepared with glycerine and gelatine, demonstrating the following pathological conditions of the pelvic organs:—1. Primary cancerous disease of both ovaries. The Fallopian tubes were unaffected. A cancerous nodule was situated between the fundus uteri and the fundus vesicæ. The utero-vesical pouch was obliterated, the bladder and uterine walls being firmly adherent. 2. Simple non-parovarian cyst of the left broad ligament with deformity and asymmetry of the uterus. 3. Hæmorrhagic cyst of the left ovary with displacement of the fimbriated extremity of the right Fallopian tube. 4. Uterus at the third month of gestation, showing retained and morbidly adherent placenta after abortion; putrefaction; septic absorption; fatal septic peritonitis. 5. Bi-lateral hydrosalpinx. The tumour on the right side, which was of the size of an infant's head, was four times as large as the left. 6. Bilateral hydrosalpinx (No. 5) with the pelvic organs *in situ*, showing adhesions passing from the tumours to the uterus, rectum, and pelvic walls.

III. THE CO-EXISTENCE OF HEART DISEASE AND PELVIC LESIONS.

By J. D. WILLIAMS, M.D., Freeland-Barbour Fellow (1888) Univ. Edin.

IT is a source of much pleasure to me, Mr President, to have the honour of bringing before you the following statistics upon the co-existence of organic heart disease and pelvic lesions.

They are based upon observations made on the pelvic organs in a series of 61 consecutive cases in the Gynæcological Laboratory of the University of Edinburgh during the last two years. The pelvic organs were carefully removed from the body at the post-mortem theatre of the Royal Infirmary, and carried over to the University in a jar of spirits, where a more detailed examination was made, and microscopical specimens prepared of interesting diseased tissues. Notes were always taken of the general morbid conditions, and in as many cases as possible the clinical history was ascertained. Most of the cases referred to in this paper came from the medical and surgical, and a few from the gynæcological wards of the Royal Infirmary.

The question of the frequency of the co-existence of organic valvular disease of the heart and pelvic lesions in the female has

never, so far as I know—my knowledge of course is very limited—been worked out from data supplied by post-mortem investigation, but from a clinical standpoint it has secured considerable attention from Nevins, who very recently read a paper on the "Frequent Association of Heart Disease with Lesions of the Pelvic Viscera in Females" before the Royal Medical and Chirurgical Society of London.

This paper which, as already stated, is based upon the investigation of the clinical history and post-mortem examination of 61 consecutive cases, is written to set forth a humble but earnest and conscientious endeavour to supply, as far as possible, a satisfactory answer to the following four questions:—

I. What proportion of women suffer from organic valvular disease of the heart, and what form of valvular disease is the most frequent?

II. What proportion of women with pelvic lesions suffer from co-existent valvular disease of the heart?

III. What proportion of women with organic valvular disease of the heart suffer from co-existent pelvic lesions?

IV. What are the pelvic lesions which are most frequently found with co-existing heart disease?

First, What proportion of women suffer from organic valvular disease? What form of cardiac lesion is the most frequent?

Of the 61 cases examined, 15, or 24·6 per cent., were found to have suffered from valvular heart disease. In 7 of these 15 cases the lesion was situated at the mitral orifice alone. In 5 of them the lesion was also mitral, but associated with concomitant aortic disease. In the remaining 3 the lesion was purely aortic. Therefore 11·4 per cent. of the entire number of cases examined suffered from pure mitral lesions, 8·2 per cent. suffered from mitral with concomitant aortic lesions, and 4·9 per cent. from pure aortic lesions.

The total number of mitral lesions in 61 cases was 12, which gives a percentage of 19·6; of these, 10 cases were cases of mitral stenosis, which gives a percentage of 16·4 for mitral stenosis.

Twelve out of the 15 cases of heart disease already referred to were cases of mitral lesions, which indicates that 80 per cent. of women affected with heart disease suffered from mitral disease. Ten of the 12 were cases of mitral stenosis with or without concomitant aortic disease,—that is to say, 66·6 per cent. of women affected with valvular disease of the heart suffered from mitral stenosis.

Résumé.—24·6 per cent. of the cases examined suffered from organic valvular heart disease; 11·4 per cent. suffered from pure mitral lesions; 8·2 per cent. suffered from mitral lesions with concomitant aortic lesions; while 4·9 per cent. suffered from pure aortic lesions. Eighty per cent. of the cases affected with heart disease suffered from mitral disease with or without concomitant

aortic disease; 66·6 per cent. of these cases were cases of mitral stenosis with or without concomitant aortic diseases.

It may be interesting to compare these figures with those in the male.

Of 100 cases examined at the post-mortem theatre of the Edinburgh Royal Infirmary during the first six months of 1889—which is the period during which the above 61 cases were examined—15 of them were found to have suffered from organic valvular disease of the heart; only 3 per cent. suffered from purely mitral lesions, and only 3 per cent. from mitral lesions with concomitant aortic disease, while 9 per cent. were affected with purely aortic disease. Of these 15 cases, 46·6 per cent. were affected with purely aortic disease; 26·6 per cent. of these were mitral stenosis with or without concomitant aortic disease.

Table showing the relative frequency of Valvular Heart Disease in the two sexes, based upon the examination of 100 male and 61 female cases.

	Female. Per cent.	Male. Per cent.
Valvular heart disease found, . . .	24·6	15
Pure mitral lesions found, ...	11·4	3
Mitral lesions with concomitant aortic disease,	8·2	3
Pure aortic lesions found, ...	4·9	9

Table showing the relative frequency of the Valves affected in the cases in which Valvular Lesions were discovered.

		Female. Per cent.	Male. Per cent.
Mitral disease, ...		80	46·6
Mitral stenosis with or without aortic lesion,		66·6	26·6
Mitral incompetence with or without aortic lesion, ...		13·3	20
Aortic disease	with or without mitral disease,	53	86·6
Aortic stenosis		26·6	26·6
Aortic incompetence		26·6	60

From what has been already stated with regard to the heart, the following conclusions seem to be warranted:—

1. That organic valvular heart disease is more frequent in women than in men.

2. That mitral lesions are met with more frequently, especially mitral stenosis, in the female than in the male.

3. That aortic lesions are comparatively rare in the female, whereas in the male they are by far the most frequent organic cardiac affections.

4. That while in the female mitral stenosis is the most frequent form of organic heart disease, mitral incompetence and aortic lesions being much less frequent; in the male, however, aortic

disease in the form of incompetence is by far and away the most frequent form of organic cardiac trouble, mitral lesions and aortic stenosis being much less frequent.

One of the chief differences of organic valvular heart disease, therefore, in its relation to the two sexes is the great predominance in the female of mitral stenosis, and in the male of aortic incompetence over all other cardiac lesions. The morbid influences which disturb the female heart seem to concentrate themselves around the mitral valve, whereas in the sterner sex they attack the aortic orifice.

Secondly, What proportion of women with pelvic lesions suffer from co-existent heart disease?

In the endeavour to supply, as far as possible, a satisfactory answer to this question, and to give a fair and a complete representation of the conditions met with, the affections of the pelvic viscera have been classified into six sections,—(1) Lesions of the uterus and cervix; (2) Lesions of the ovaries; (3) Lesions of the Fallopian tubes; (4) Lesions of the broad ligaments; (5) Lesions of the external genitals and rectum; (6) Lesions of the pelvic peritoneum and cellular tissue.

The cases have been arranged into a series of tables, a table having been constructed for each section (Tables A). These tables show—(1) The number of cases found affected with each lesion in 61 cases; (2) The percentage of cases affected; (3) The number of cases in which heart disease co-existed with each lesion; (4) The percentage of heart disease discovered.

Uterus.—Table A.

Table showing the number of Uterine Lesions in 61 consecutive cases, and the percentages of Heart Disease discovered.

	Disease.	No. of Cases.	Per-centages.	Cases of Heart Disease.	Per-centages of Heart Disease.
Uterus.	Perimetritis,	21	34·4	5	23·8
	Endometritis,	7	11·5	4	57
	Congestion,	3	4·9	2	66
	Fibroids,	6	9·8	1	16·6
	Uterine polypi,	3	4·9	1	33
	Hypertrophy,	2	3·2	1	50
	Versions,	7	11·5	3	43
Cervix.	Endocervicitis,	21	34·4	10	47·6
	Lacerations,	6	9·8	3	50
	True ulceration,	3	4·9	1	33·3
	Eversion of muc. memb. and catarrhal patches,	9	14·7	4	44·4
	Conical cervix and stenosis,	3	4·9	1	33·3
	Cervical polypi,	2	3·2	0	0
	Hypertrophy of cervix,	1	1·6	0	0

Fallopian Tubes.—Table A.

Table showing the number of Tubal Lesions in 61 consecutive cases, and the percentages of Heart Disease discovered.

Disease.	No. of Cases.	Per-centages.	Cases of Heart Disease.	Per-centages of Heart Disease.
Perisalpingitis, ...	23	37·7	7	30·4
Endosalpingitis, . . .	10	16·3	3	30
Congestion, ...	7	11·5	4	57
Displacement, ...	8	13·1	3	37·5
Hydro-salpinx, ...	7	11·5	3	43
Serous cysts, ...	8	13·1	5	62·5
Hydatid of Morgagni, . .	5	8·2	1	20
Accessory fimbriated ends, .	2	3·2	1	50
Hæmato-salpinx, . . .	1	1·6	0	0
Cancer, ...	1	1·6	0	0

Ovaries.—Table A.

Table showing the number of Ovarian Lesions in 61 consecutive cases, and the percentages of Heart Disease discovered.

Disease.	No. of Cases.	Per-centages.	Cases of Heart Disease.	Per-centages of Heart Disease.
Periovaritis, ...	18	29·5	5	27·7
Acute ovaritis, ...	4	6·5	2	50
Chronic ovaritis, . . .	8	13·1	2	25
Displacement, ...	8	13·1	3	37·5
Congestion, ...	6	9·8	2	33·3
Cystic, ...	10	16·3	2	20
Dermoid cyst, ...	1	1·6	0	0
Blood cyst, ...	1	1·6	0	0
Cancer, ...	2	3·2	1	50

[Broad Ligaments.—Table A.

BROAD LIGAMENTS.—TABLE A.

Table showing the number of Broad Ligament Lesions in 61 consecutive cases, and the percentages of Heart Disease discovered.

Disease.	No. of Cases.	Per-centages.	Cases of Heart Disease.	Per-centages of Heart Disease.
Pedunculated cyst of the tubules of Kobelt,	35	57·4	8	23
Sessile cysts of the tubules of Kobelt,	16	26·2	3	18·7
Pedunculated cyst of the vertical parovarian tubules,	4	6·5	1	25
Sessile cysts of ditto,	15	24·6	4	26·6
Sessile cysts of broad ligaments,	15	24·6	3	20
Sessile cysts of broad ligaments close to the ovarian fimbria,	11	18	3	27·2
Pedunculated cyst of the duct of Gartner,	10	16·3	5	50
Congestion,	4	6·5	2	50
Cellulitic thickening,	6	9·8	2	33·3
Cancer (secondary),	2	3·2	1	50
Varicosity of pampiniform plexus,	2	3·2	1	50
Phleboliths in ditto,	2	3·2	1	50

EXTERNAL GENITALS AND RECTUM.—TABLE A.

Table showing the number of Vulvar Lesions in 61 consecutive cases, and the percentages of Heart Disease discovered.

Disease.	No. of Cases.	Per-centages.	Cases of Heart Disease.	Per-centages of Heart Disease.
Hypertrophy of labia minora,	2	3·2	1	50
Urethral caruncles,	3	4·9	2	66·6
Hæmorrhoids,	8	13·1	5	62·5

PELVIC PERITONITIS AND CELLULITIS.—TABLE A.

Table showing the number of cases of Peritonitis and Cellulitis in 61 consecutive cases, and the percentages of Heart Disease discovered.

Disease.	No. of Cases.	Per-centages.	Cases of Heart Disease.	Per-centages of Heart Disease.
Pelvic peritonitis and cellulitis,	29	47	7	24

Thirdly, What proportion of women affected with organic heart disease suffer from co-existent pelvic lesions ?

As when dealing with question 2, the affections of the pelvic viscera have been divided into six sections and the cases arranged in tabular form—a table, as before, being constructed for each section (Tables B). These tables show—(1) The number of cases in which pelvic lesions and heart disease co-existed; (2) Total number of cases of heart disease discovered in 61 consecutive cases; (3) Percentage of pelvic lesions discovered.

Uterus.—Table B.

Table showing the number of Valvular Heart Diseases in 61 consecutive cases, and the percentages of Uterine Lesions discovered.

	Disease.	Cases of Heart Disease with co-existent Uterine Lesion.	Total Cases of Heart Disease.	Percentages of Uterine Lesions.
Uterus.	Perimetritis,	5	15	33
	Endometritis,	4	15	26·6
	Congestion,	2	„	13·3
	Fibroids,	1	„	6·6
	Uterine polypi,	1	„	6·6
	Hypertrophy,	1	„	6·6
	Versions,	2	„	13·3
Cervix.	Endocervicitis,	10	„	66·6
	Lacerations,	3	„	20
	True ulceration,	1	„	6·6
	Eversion of muc. memb. and catarrhal patches,	4	„	26·6
	Conical cervix and stenosis,	1	„	6·6
	Cervical polypi,	0	„	0
	Hypertrophy of cervix,	0	„	0

Fallopian Tubes.—Table B.

Table showing the number of Valvular Heart Diseases in 61 consecutive cases, and the percentages of Tubal Lesions discovered.

Disease.	Cases of Heart Disease with co-existent Tubal Lesion.	Total Cases of Heart Disease.	Percentages of Tubal Lesion.
Perisalpingitis,	7	15	46·6
Endosalpingitis,	3	„	20
Congestion,	4	„	26·6
Displacement,	3	„	20
Hydro-salpinx,	3	„	20
Serous cysts,	5	„	33
Hydatid of Morgagni,	1	„	6·6
Accessory fimbriated end,	1	„	6·6
Hæmato-salpinx,	0	„	0
Cancer,	0	„	0

Ovaries.—Table B.

Table showing the number of Valvular Heart Diseases in 61 consecutive cases, and the percentages of Ovarian Lesions discovered.

Disease.	Cases of Heart Disease with co-existent Ovarian Lesion.	Total Cases of Heart Disease.	Percentages of Ovarian Lesion.
Periovaritis,	5	15	33
Acute ovaritis,	2	„	13·3
Chronic „	2	„	13·3
Displacement,	3	„	20
Congestion,	2	„	13·3
Cystic,	2	„	13·3
Dermoid cyst,	0	„	0
Blood cyst,	0	„	0
Cancer,	1	„	6·6

Broad Ligaments.—Table B.

Table showing the number of Valvular Heart Diseases in 61 consecutive cases, and the percentages of Broad Ligament Lesions discovered.

Disease.	Cases of Heart Disease with co-existent Broad Ligament Lesions.	Total Cases of Heart Disease.	Percentages of Broad Ligament Lesions.
Pendunculated cysts of the tubules of Kobelt,	8	15	53·3
Sessile cysts of the tubules of Kobelt,	3	„	20
Pedunculated cysts of the vertical parovarian tubules,	1	„	6·6
Sessile cysts of do.,	4	„	26·6
Sessile cysts of broad ligaments,	3	„	20
Sessile cysts of broad ligaments close to ovarian fimbria,	11	„	73·3
Pedunculated terminal cyst of the duct of Gartner,	5	„	33·3
Congestion,	2	„	13·3
Cellulitic thickening,	2	„	13·3
Cancer (secondary),	1	„	6·6
Varicosity of pampiniform plexus,	1	„	6·6
Phleboliths in pampiniform plexus,	1	„	6·6

External Genitals and Rectum.—Table B.

Table showing the number of Valvular Heart Diseases in 61 consecutive cases, and the percentages of Vulvar Lesions discovered.

Disease	Cases of Heart Disease with co-existent Vulvar Lesions.	Total Cases of Heart Disease.	Percentages of Vulvar Lesions.
Hypertrophy of labia minora,	1	15	6·6
Urethral caruncles, . .	2	„	13·3
Hæmorrhoids, . . .	6	„	40

Pelvic Peritonitis and Cellulitis.—Table B.

Table showing the number of Valvular Heart Lesions in 61 consecutive cases, and the percentage of Peritonitis and Cellulitis discovered.

Disease.	Cases of Heart Disease with co-existent Peritonitis and Cellulitis.	Total Cases of Heart Disease.	Percentage of Peritonitis and Cellulitis.
Pelvic peritonitis and cellulitis, ...	7	15	46·6

In the foregoing tables it must here be remarked, that where several pelvic lesions presented themselves it was found necessary to enumerate the same case more than once, as, for instance, a case in which perimetritis existed and also endocervicitis, appears under both these headings, and therefore the aggregate numbers will be found much higher than the total number given.

Fourthly, What are the pelvic lesions which are most frequently found with co-existent organic heart disease?

In order to indicate the relative frequency with which pelvic lesions and heart disease co-existed in the 61 cases examined, it has here again been found necessary to have recourse to a tabular arrangement. Table C is a compound of the last column in tables A and B. The figures in these columns corresponding to each heading were added together, the product halved, and the result taken as the average percentage. This number determines the sequence in the table, which indicates not only what pelvic lesions are most frequently co-existent with heart disease, but also the relative frequency with which heart disease co-existed with each.

Table C.

Table showing the relative frequency with which Pelvic Lesions and Heart Disease co-existed in 61 consecutive cases expressed in percentages.

Disease.	Average Percentage of Heart Disease.
Endocervicitis,	57
Hæmorrhoids,	51·2
Sessile cysts of the broad ligaments situated close to the ovarian fimbria,	50·4
Sessile cysts in serous covering of the Fallopian tubes,	47·7
Endometritis,	41·8
Congestion of Fallopian tubes,	41·8
Pedunculated terminal cysts of the duct of Gartner,	41·2
Urethral caruncles,	39·9
Congestion of the uterus,	39·6
Perisalpingitis,	38·5
Pedunculated cysts of the tubules of Kobelt,	38
Pelvic peritonitis and cellulitis,	35·8
Eversion of the muc. memb. of cervix and catarrhal patches,	35·5
Laceration of the cervix,	35
Acute ovaritis,	31·6
Hydro-salpinx,	31·5
Congestion of the broad ligaments,	31·6
Periovaritis,	30·3
Displacement of the tubes and ovaries,	28·7
Perimetritis,	28·4
Cancer of the ovaries,	28·3
Accessory fimbriated ends of Fallopian tubes,	28·3
Cancer of broad ligaments,	28·3
Hypertrophy of the uterus,	28·3
Varicosity of, and phleboliths in pampiniform plexus,	28·3
Versions of the uterus,	28·1
Hypertrophy of the labia minora,	28
Sessile cysts of vertical parovarian tubules,	26·6
Endosalpingitis,	25
Congestion of the ovaries,	23·3
Cellulitic thickening of broad ligaments,	23·3
Cystic disease of the ovaries,	21·6
Sessile cysts of the broad ligaments,	20
Conical cervix and stenosis,	19·9
True ulceration of cervix,	19·9
Uterine polypi,	19·8
Sessile cysts of the tubules of Kobelt,	19·3
Chronic ovaritis,	19·1
Pedunculated cysts of the vertical parovarian tubules,	15·8
Hydatids of Morgagni,	13·3
Uterine fibroids,	11·8

A glance at the foregoing tables readily shows that the most frequent pelvic lesions met with, excepting the small pedunculated cysts which hang from the tubules of Kobelt on the anterior layer of the mesosalpinx, and which are never large, and vary in size from a pea to that of a bean, are pelvic peritonitis and cellulitis and catarrh of the cervix. Whenever adhesions, however delicate, were noticed passing from one pelvic organ to one or more of the neighbouring organs, the case was always called one of pelvic peritonitis. Perimetritis and perisalpingitis occurred more frequently than periovaritis; the former had a percentage of 34 and 37 respectively, while the latter had a percentage of 29.

In Table C., where the pelvic lesions are classified according to the relative frequency with which heart disease co-existed, the foremost position is occupied by endocervicitis. With the exception of the broad ligament and parovarian cysts, the majority of which were small, two only reaching the size of an orange, the next most frequent affections in which heart disease co-existed are the congestive and inflammatory lesions of the uterus, Fallopian tubes, and ovaries. This seems to indicate that heart disease is more closely associated with these than with the other lesions. I have, however, refrained from drawing any conclusions as to the etiological relation of organic heart disease and pelvic lesions, which I leave to those who have greater experience and are better able, my object being more to give a conscientious record of the conditions met with than to draw hasty conclusions, as the cases are too few to attribute any ætiological value to either.

The co-existence of heart disease and pelvic disorders in women has long been recognised by physicians. The late Dr Hilton Fagge, in his text-book on *The Principles and Practice of Medicine* (vol. i., 2nd edition, 1888), remarks that Dr Pott found, from the analysis of the records of Guy's Hospital, that sclerotic endocarditis, as it affects the mitral valve and leads to stenosis of the left auriculo-ventricular opening, is frequently associated in women with uterine disorders. He also states that mitral stenosis is much more frequent in women than in men (p. 954).

In the *Lancet* (vol. i., 1884, p. 1068) the late Dr Milner-Fothergill also refers to the frequency with which functional cardiac disorders are found associated with pelvic lesions in the female.

With regard to the menstrual history of the 15 cases which presented organic cardiac lesions, two of them suffered from menorrhagia, in six the flow was scanty and short in duration, in four it was normal, while in the remaining three there was no reference to the menstrual history in the Hospital records. As to the question whether the pelvic lesions preceded those of the heart, it may be stated that nine out of the fifteen were admitted with evident symptoms of heart disease, from which they had suffered more or less for several months, and in some cases for several years. In two out of the nine the patients had been

under treatment for heart disease at the Hospital many years before.

Professor Simpson thought the Society was to be congratulated on the first appearance of Dr Williams as a contributor to its Transactions. It was a very meritorious attempt he had made to bring into view the relation between cardiac and pelvic lesions as seen in the post-mortem theatre. Dr Williams had refrained from drawing deductions from his statistics; but it was important to have such statistics recorded and multiplied, and the conclusions to be derived from them would gradually become more clear. Most of the members of the Society had opportunities of studying this subject in its clinical aspect. Such observations, however, as Dr Williams had brought before them could only be made by one devoting his time to the subject, and so far as could be gathered from listening to his paper, the anatomical results confirmed what was to be expected from clinical study,—such, for example, as that endo-cervicitis and other congestive processes should be the most frequent concomitants of cardiac disease. It would add to the value of Dr Williams' paper if he would introduce some notice of the relative frequency of cardiac affections as observed in other conditions, such as might be found in works on heart disease; and again if he would make a note as to whether the patients were married or unmarried. For there were various circumstances that required to be kept in view before conclusions could be drawn from the data given—endo-cervicitis being more frequent already in the married than in the unmarried. He (Prof. Simpson) hoped Dr Williams would yet add other valuable material to the Society's Transactions.

Dr James Carmichael thought that the material collected by Dr Williams was of great value, and ought to be useful in making deductions as to the true relation between pelvic and cardiac disease. He had not gathered from Dr Williams' paper that any reference had been made or details given of the clinical history of the cases, particularly which was the primary or antecedent disease, whether pelvic disease had any influence in predisposing to cardiac disease in the same way as kidney disease, for instance. A further elaboration of the paper by more particular reference to clinical detail would, he thought, be desirable.

Dr Barbour thought the paper was of special value as the first effort to work up systematically the pathological material from diseases of the female pelvic organs in the Edinburgh Infirmary. Hitherto this had been too much neglected, and Dr Williams' careful record of the pathological conditions in the pelvis was significant as a first step in the right direction, and the facts recorded were of the greatest value apart from the deductions which might be made from them. The gelatine casts of the pelvis were a new feature in gynæcology, and especially useful for teach-

ing purposes, as they gave a very good idea of the morbid appearances and relations. The preparation of such casts involved an amount of work and attention to small details which only those who had time to make them could appreciate. As to the results of the inquiry, the relation of mitral and aortic diseases in the sexes was striking, and he would like to know if it was borne out by the statistics of others. As to the frequency of heart lesions in relation to the various forms of pelvic disease, it would be necessary first to have a table of the relative frequency of the various affections apart from heart disease; for example, cervical catarrh was perhaps the most frequent lesion altogether independent of heart disease. At the same time, the great frequency of inflammatory conditions generally was noteworthy; and it was very important to trace out the connexion between local lesions and more general conditions, as we are apt to attend too much to the former.

Dr J. W. Ballantyne said that he had had the advantage of watching the gradual evolution of the paper, to which he felt sure they had all listened with much interest, and he could say that Dr Williams had commenced his observations with no preconceived ideas as to the frequent co-existence of heart disease and pelvic lesions demonstrated by the data which had been to-night laid before the Society. The frequent association of endo-cervicitis and heart disease was a most noteworthy fact, which Dr Williams had elicited by his statistical researches. Dr Ballantyne also thought the Society was indebted to Dr Williams for the demonstration of the relations of the pelvic organs given in the casts, and he could bear witness to the great expenditure of time and labour which the making of these casts involved.

The President congratulated Dr Williams on his valuable paper, which represented a great deal of work. He agreed with Dr J. Carmichael that clinical details would have helped to clear up matters. One required to know the blood and renal conditions in such cases, keeping in mind, for instance, the connexion that had been established between albuminuria and placental infarcts.

Dr Williams thanked the Society for the kind way in which they had received his paper. With regard to the criticism made by Dr Carmichael, he wished to state that it was an extremely difficult matter to get clinical information of all the cases admitted into the Royal Infirmary, a good number of them being admitted in a comatose and moribund condition; but in each case a vigorous endeavour was made to get as much clinical history as possible. In reference to the question as to whether the cardiac or pelvic disease were the primary, he thought there was distinct evidence in two of the cases that the cardiac lesion had preceded the pelvic.

IV. ON THE TREATMENT OF RUPTURE OF THE UTERUS.

By D. Berry Hart, M.D., F.R.C.P. Ed., F.R.S. Ed., President of the Edinburgh Obstetrical Society, etc.

Bandl's great work on *Rupture of the Uterus* not only made the cause of the vast majority of cases of uterine rupture perfectly simple, but also the means for its prevention attainable and clear. Since his monograph in 1875 we have had more exact anatomical research and a fuller knowledge of the physiology of labour, but all these later advances have been insignificant as compared with the great stride of the Vienna obstetrician. Cases of uterine rupture have, however, not disappeared from practice, and we have still to settle what can best be done for the unfortunate woman who suffers from this appalling accident.

My personal experience of this disaster is based on five cases, all of whom have died. In the second case I met with I drained, but without success. In the third and fourth the patients became moribund shortly after the occurrence of the rupture; while in the fifth I did abdominal section and Prevôt's operation. Though this last case was also fatal, it presents points of interest; and as the experience of other operators has been better than my own, I have deemed it advisable to bring the subject before you to-night, so as to draw attention to the treatment of an accident too often regarded in this country as almost unavoidably fatal.

My fifth case is as follows:—

Report by Drs Fitzgerald and Melville.

Mrs C., æt. 41 years, residing at 3 Burns Land, Greenside Row, x.-para. Her previous children were born living and healthy. The labours were all slow and lingering, except the ninth, in which the membranes broke unexpectedly at a meal, the child being born in an hour and a half. She menstruated last in the beginning of July, and had not been very strong during the last few months. She had influenza at the New Year, and shivered for two days; she had also a cough and a pain in her left side, which appears to have been due to pleurisy.

Present Pregnancy.—Membranes ruptured when she was sitting at her dinner at two o'clock. There were no previous pains. The student arrived at a quarter to three o'clock, and found the patient in bed. Her face was pale and emaciated. On palpation of abdomen, walls were tense and resistent. The uterus was felt firm and hard, but no contractions were made out. The position of the head could not be ascertained. On auscultation, the fœtal heart sounds could not be heard. On vaginal examination the vagina was roomy and moist. The os uteri was not dilated, and barely admitted the tip of the finger; no presenting part could be

felt. She had had no pains up till now, except now and then very slight lingering pains at the front of the lower part of the abdomen. No pains whatever at the back. The student left at 3.20 P.M., with instructions to be sent for if the pains came on stronger. He returned at 6 P.M., and found the os had dilated considerably, and would now admit of three fingers. A smooth fleshy mass could be felt presenting, but could not be accurately diagnosed. Fœtal heart sounds could not be made out. The pains were still of the same lingering character, and all at front of abdomen. They were a little stronger than previously, but still slight in nature. She was ordered a hot douche at 6 30 P.M., and another at 7.15 P.M. At 7.40 P.M. the presentation was diagnosed to be a shoulder, and assistance was sent for to the Maternity Hospital.

The house-surgeon arrived at 8.30 P.M. The uterus was found in a state of tonic contraction. No fœtal heart sounds could be made out. Chloroform was administered, and on vaginal examination the presentation was found to be the right shoulder. The child lay in the dorso-anterior, left cephalo-iliac position. The question of turning was now discussed, and it was decided not to do so on account of the tonic contraction of the uterus and the firm impaction of the shoulder, and Dr Hart was sent for. During the interval before the arrival of Dr Berry Hart, patient lay quietly. There was no visible sign of any strong pain, and she exhibited no signs of collapse or shock.

On Dr Berry Hart's arrival at 10 P.M. the administration of chloroform was at once resumed, and immediately on his palpating the uterus he diagnosed rupture. The fœtus could be palpated out high up in the abdomen, and the empty uterus felt in the hypogastric region. He passed his hand through the rent, and seizing a leg of the child attempted to draw it back through the rupture, but was compelled to desist, owing to the bowel coming with it.

Dr Hart then proceeded to perform abdominal section; and cutting through the abdominal walls in the middle line, opened the peritoneal cavity and lifted out the child; he also removed the placenta which had been extruded from the uterus, a small portion only remaining attached to it. The uterus was then lifted forwards out of the abdominal cavity, and an attempt made to ligature it by a piece of elastic tubing. This tubing broke, and nothing else being available, a strong piece of twine was passed round the lower uterine segment and fastened securely. (The twine was afterwards replaced by a piece of the tubing generally used for ligature of uterus in Porro's operation.) The uterus was now amputated above the lower uterine segment. Some bleeding vessels were ligatured, and the abdominal cavity thoroughly douched out with hot water. There being only one sponge available, strips of clean cloth were used in addition. The ligature clamped the stump of the uterus a little above the lower limit of the rupture in the uterine

wall; but a piece of the peritoneum forming the fold of Douglas was pulled in under the loop of the ligature, and so cut off the peritoneal cavity from the vagina. The incision in the abdominal wall was closed by silk sutures, which were passed deeply, so as to include skin, muscle, and peritoneum; five or six sutures were used. The stump of the uterus was brought through the external incision, and secured in that position by transfixing it with knitting needles. The wound was dressed by iodoform gauze, and a binder applied over all. The antiseptic used was corrosive sublimate. During the whole course of the operation the patient had been receiving frequent subcutaneous injections of ether; brandy was also given.

The operation was concluded at a quarter past eleven; and the pulse being barely palpable and the patient collapsed, one of the house-surgeons left for the transfusion apparatus. In the meantime brandy was given by the mouth, and also digitalis in the form of the tincture. On the arrival of the transfusion apparatus, 27 oz. of sterilized salt solution, of strength of ʒj. to the pint of boiled water, was injected into the infra-clavicular subcutaneous tissue by means of syphon action. (Temperature of transfused fluid, 100° F.) This caused no appreciable improvement in the pulse, and the patient sank rapidly, the pulse being palpable at the radial artery ten minutes before death, which occurred at 20 minutes to 1 A.M.

The child was a male and still-born; the skin was peeling off in some places. The skin over right shoulder was much discoloured by a well-marked caput succedaneum on it. Placenta was normal.

This gives the account of the case from the spectator's point of view. How the case struck me is briefly as follows:—When I was summoned to the patient I took with me Braun's blunt hook for decapitation, not anticipating anything more serious. When narcosis was completed, however, and inspection was made of the bared abdominal surface, it was evident that the flattening of the recti as the patient strained pointed to something abnormal. On palpation, therefore, I was not surprised to be able to make out the fœtus distinctly through the abdominal wall, and feel the body of the uterus apart from it and below the umbilicus. I accordingly diagnosed uterine rupture, and passed my hand into the vagina to ascertain its extent. I found it to be a huge one at the upper limit of the lower uterine segment posteriorly, easily admitting the entire hand. Blood poured through the rent, and as I believed the case to be, if not hopeless, a very bad one, I thought it best to attempt delivery of the child and placenta through the rent, and then to see what next could be done in the way of treating the rupture by the iodoform gauze tampon, as has been recently practised so successfully by Leopold and others. I accordingly seized the foot of the child and drew it down, but

speedily desisted, as I found that with it the small intestines were descending through the rent. No course was therefore left to me but the performance of abdominal section, and I did this all the more readily as I saw I could deal with the rent then either by supravaginal amputation of the uterus or otherwise, as I thought fit. One difficulty was the armamentarium, as when mustered it only amounted to one knife, indiarubber tubing, needles and thread, one pair of Péan forceps, and one sponge, which an obliging but tipsy female neighbour sacrificed for the emergency. The house was a hovel, and the light scanty, but everything depended on speed, and sending to hospital would have involved nearly an hour's delay. When the abdomen was opened venous blood poured out, so that I at once seized the uterus and passed tubing round it. Part of the rent was still below the level of the tubing, but I was able to pull loose peritoneum from the pouch of Douglas below the constricting tube, and thus shut off the vaginal from the peritoneal cavity. I then cut off the uterus above the ligature (supravaginal operation—Prevôt's operation), made a careful peritoneal toilette, and closed the wound as already described. During the peritoneal toilette large clots were removed from the flanks. From what has been said, it will be seen that abdominal section was imperative here to extract the child and placenta. The method of treating the rent adopted seemed to me to be the best for this special case; but I wish to point out that various methods may be employed, and it requires a statistical record of all cases to help us to settle which gives the mother the best chance. I therefore now wish to make a few remarks on the treatment of uterine rupture in general. In cases of rupture where the presenting part is still in the genital tract, it is evident we must deliver it in such a way as to avoid upward tension on the uterus, and therefore craniotomy or decapitation as necessary should be quickly employed. If the rent is not extensive, local irrigation with a dilute corrosive lotion, drainage, and abdominal pressure, or tamponnade of the uterus, vagina, and rent, with iodoform gauze should be performed; when the rent is more extensive, the edges should be approximated with tenacula while the tampon is being applied.

With an extensive tear and escape of child and placenta, or any one of them, into the cavity, laparotomy is imperative for extraction and peritoneal toilette. Extensive tear means bleeding into the peritoneum, and great risk of ultimate septicæmia if the blood be not removed. The treatment of the extensive rent is the next question. Suturing alone is ineffective, takes long, and has not been followed by good results. It is in such that our choice lies between Prevôt's amputation or careful tamponning vaginally and peritoneally with iodoform gauze. Recently Coe has had a successful case where he amputated the uterus and sutured the right utero-sacral fold. In sixteen cases of this amputation five recovered. Leopold, however, has recently recorded a case where the rent

involved three-fourths of the lower uterine segment, and where the uterus was only attached by the left broad ligament. In this case laparotomy was performed, the pouch of Douglas plugged with a long strip of iodoform gauze, which was applied to the edges of the tear, brought round between the right side of the uterus and pelvic wall, into the vesico-uterine pouch, and its end out at the abdominal wound. The uterine cavity and vagina were plugged with another strip. These were left in for fifteen days, and the patient made an uninterrupted recovery. In seven cases treated thus, Leopold saved two. From this I think we should all endeavour to give such cases the chance that operative treatment holds out. Many of them are hopeless, but even the most skilled prognosis is sometimes at fault, and it is not the duty of any man in such emergencies to fold his hands and say the case is hopeless, the woman must be left to die.

Literature.

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Leopold. — "Zur Behandlung der Uterus-ruptur," *Arch. für Gynäk*, Bd. xxxvi., Hft. 2.

Piscaçek. — *Beiträge zur Therapie und Casuistik der Uterusrupturen.* Wien, 1889.

Veit.—In *Handbücher*, by Muller and Schroeder.

Zweifel.—*Lehrbuch der Geburtshülfe.* Stuttgart, 1887.

Prof. Simpson thought the Society was indebted to the President for the record of this rare case, and his *résumé* of the different methods of treatment that could be followed. He spoke of it as a rare case, for happily this complication was very seldom met with in Edinburgh. He (Prof. Simpson) could not recall a case for the last twenty years, and the meaning of that was that the obstetricians of Edinburgh took good care of their patients, for in most instances rupture of the uterus was the result of a mismanaged labour. In the only two cases he had seen laparotomy was performed, and the infants extracted through the abdominal wound. Both of the patients died, but even yet he was doubtful if removal of the uterus would have contributed to recovery. No rule for treatment could be laid down that was applicable to every case, for the condition of the patients and the amount of damage to the uterus varied in different instances, and these would modify our impression as to what was best to be done in any individual case. On the whole, he regarded the suggestions of Dr Hart as correct, although it might not be necessary so frequently to amputate the uterus as he had indicated. In cases, for instance,

where there was no further hæmorrhage it might be uncalled for.

Dr Barbour wished to draw attention to one remark in Dr Hart's very valuable paper, lest there should be any misapprehension. He had recommended that in all cases in which the fœtus had escaped into the peritoneal cavity abdominal section should be performed at once. In Dr Hart's own case it had been done only after an attempt had been made to deliver the child by the natural passages through the rent, and because this attempt failed owing to the intestines coming through the rent. Dr Barbour thought that delivery through the rent should always be attempted in the first instance, because this had given so much better results in the hands of some obstetricians than abdominal section. When attending the late Professor Schroeder's clinique in Berlin, he had been greatly impressed by Professor Schroeder's experiences in such cases. The first cases in which abdominal section had been done, with the most careful precautions, had all died, so that when the next presented itself, he was so disgusted with the results of section that he just pulled the child out through the rent and stuck in a drainage-tube. To his surprise the patient recovered, and this led him to do the same in subsequent cases, and with a like good result. Of course, in cases of dangerous hæmorrhage or a very extensive tear, it might be evident from the first that abdominal section was the only treatment—each case must be judged on its own merits. But he thought that it was a mistake to regard it as the certain treatment for such cases.

The President thanked the Fellows for the discussion on his paper. Every case must be treated on its own merits, and cases of rupture varied very much. He did not favour delivery through the rent: laparotomy he thought better, as in such cases one could cleanse the peritoneum. He had several times used Carl Braun's blunt hook for decapitation, and had been struck with its efficiency. The iodoform tampon seemed a strange method of treatment, but the results had been good, and when one remembered that it gave rest, drainage, and arrest of bleeding, its success was explained.

V. REPORT OF THE ROYAL MATERNITY AND SIMPSON MEMORIAL HOSPITAL FOR THE QUARTER ENDING 31ST JANUARY 1890.

By WILLIAM FORDYCE, M.A., M.B., C.M., and JAMES LACKIE, M.B., C.M., Resident Surgeons.

INTERN CASES.

DURING the quarter 64 women were delivered in the Hospital. Eighteen of these patients were married; 33 were i.-paræ, 12 ii.-paræ, 4 iii.-paræ, 3 iv.-paræ, 5 v.-paræ, 4 vi.-paræ, 1 vii.-para, 1 xi.-para, 1 xiv.-para.

Age.—(*a.*) Primiparæ: average age, 22·8 years; youngest, 18; oldest, 40 years. (*b.*) Multiparæ: average age, 27 years; youngest, 22; oldest, 43 years.

Duration of Labour.—(*a.*) Primiparæ: average duration of first stage, 12 hours 50 minutes; second stage, 2 hours 48 minutes; third stage, 13 minutes 50 seconds; whole labour, 16 hours 6 minutes. (*b.*) Multiparæ: average duration of first stage, 8 hours 12 minutes; second stage, 1 hour 59 minutes; third stage, 13 minutes 53 seconds; whole labour, 13 hours 1 minute.

Presentations and Positions,—Primiparæ—I. Longitudinal: (1.) Cephalic, vertex, L.O.A. 23, R.O.P. 5, R.O.A. 2; (2.) Breech, L.S.A. 3; total, 33. II. Transverse, 0. *Multiparæ*—I. Longitudinal: (1.) Cephalic, vertex, L.O.A. 22, R.O.P. 3, R.O.A. 2, L.O.P. 1; (2.) Breech, L.S.A. 1; total, 29. II. Transverse, 0.

Sex and Weight of Child.—Primiparæ: males 16, females 16. Average male weighed 7 lbs. 5 oz.; heaviest, 9 lbs. 4 oz. Average female weighed 7 lbs. 1 oz.; heaviest, 9 lbs. 4 oz. Multiparæ: males 13, females 17. Average male weighed 7 lbs. 6 oz.; heaviest, 8 lbs. 8 oz. Average female weighed 7 lbs. 4 oz.; heaviest, 9 lbs. 5 oz.

Length of Children.—Average male, 20 inches; longest, 22·5 inches. Average female, 20 inches; longest, 23 inches.

Placenta.—Average weight, 1 lb. 6 oz.; heaviest, 2 lbs.; lightest, 15 oz.

Cord.—Average length, 21·63 inches; longest, 32·5 inches; shortest, 12 inches. The insertion in 2 cases was marginal; in 1 velamentous.

Peculiarities of Children.—In one case there was hypospadias; in another, complete cleft palate, lip intact.

Classification of Labours.—Natural, 34; laborious—lingering 10, instrumental 11; preternatural, 4; complex, 3; abortions, 2; total, 64.

Natural Labours.—In 5 cases the second stage was precipitate. In two cases the labour was premature at the 6½ month.

Instrumental Labours.—There were 11 of these. Axis-traction forceps were applied in 1 case for justo-minor pelvis and large head; in 8 cases for exhaustion and threatening inertia in the second stage; in 1 case for rigid soft parts in a primipara of 40; in 1 case for persistent R.O.P.

Preternatural Labours.—There were 4 breech cases, all L.S.A. Three were at full time; 1 was in a case of accidental hæmorrhage, and was at the 6½ month. One of the full-time children was putrid; the other 2 were born alive.

Complex Labours.—One was a case of eclampsia—death of mother and child. Two were cases of placenta prævia. In the first of these mother recovered, child died; in the second both mother and child did well, child being an eighth month, and was reared in the incubator. One was a case of labour complicated by heart disease; mother and child did well. These cases detailed farther on.

Abortions.—Both were cases of incomplete abortion at the fourth month; fœtus was born before admission, but most of the secundines were removed artificially. In either case there was no history of syphilis; the exciting cause in both was overwork on the part of the mother.

Premature Labours.—There were 2 of these, both at the $6\frac{1}{2}$ month, from accidental hæmorrhage. The children were born dead. One case of placenta prævia was at the eighth month.

Adherent Placenta.—There was no case of this. In 1 case the membranes were retained, and were removed by the introduction of the fingers into the uterus.

Torn Perineum occurred in several cases. In all the tear was trifling, and in no case did it involve the sphincter ani. Silkworm gut sutures were used, and union was perfect in every case.

Ophthalmia Neonatorum occurred in no case during the quarter. A 2 per cent. sol. of $AgNO_3$ was used as a prophylactic in most cases.

Puerperium.—One case in which the child was born putrid and the membranes retained and removed artificially developed high temperature and rapid pulse on the second day after delivery. For six days patient was very ill, but under uterine douche treatment and febrifuges she ultimately made a good recovery. One patient was admitted suffering from bronchitis, and after delivery showed signs of broncho-pneumonia. She made a good recovery.

Mortality.—Maternal, 2. One from eclampsia, 1 from gonorrhœal salpingitis and subsequent peritonitis (see below). Fœtal, 7. One was premature in the case of eclampsia; 2 were premature from accidental hæmorrhage; 3 were born putrid, probably syphilitic; 1 was at full time, cause of death uncertain. Infantile, 2. One in the case of justo-minor pelvis, in which high forceps were applied; child died after thirty-two hours from peritonitis. The other was that of the child of the primipara of 40. It was delivered by forceps, and lived thirty-six hours, but the cause of death was not evident.

The following cases call for special attention:—

Case of Placenta Prævia.

Mrs R., aged 43, x.-para. Last child was born in 1887; first in 1871. Labours all natural.

Admitted to Hospital on 28th December. Patient was about nine months pregnant. Previous to admission had had three severe floodings on the 14th, 21st, and 28th December. On the last occasion she was seen by her doctor, who advised her removal to the Maternity Hospital, to which she was admitted at 11 P.M.

On admission she was in a state of collapse—pale, cold, restless—and could scarcely answer questions. Her pulse was rapid and very small. Her face was swollen, and the lower limbs œdematous.

Her urine contained a considerable amount of albumen. There was slight hæmorrhage from the vagina.

Per vaginam the os was about the size of a crown piece and soft. Placental tissue could be felt extending about half-way across the os. Anteriorly the membranes and through them the presenting head could be made out. Patient was douched and the vagina plugged, while Dr Hart was sent for. Brandy and ether were also freely given, and the administration of these was kept up till after delivery. On Dr Hart's arrival he dilated the os with Barnes's bags, and after half an hour turned, having ruptured the membranes anteriorly. One leg was brought down, and the cervix thus being plugged, the case was left to nature, stimulants being freely given in the meantime. At 7 A.M. the breech was born by natural efforts. The arms were then brought down, and the head delivered by Smellie's grasp. The child was born dead. The placenta followed in fifteen minutes. Neither during nor after the third stage was there any hæmorrhage. Ergotin was given hypodermically. After delivery temperature was 98°·4; pulse 104, regular, but very small.

Puerperium.—For some days after delivery patient remained very weak. She was profoundly anæmic. The blood corpuscles numbered 1450·000 per cubic millimetre on 1st January. She slowly improved under the free use of stimulants and iron. The albumen in the urine slowly disappeared, as also the œdema of face and legs. The urine at no time contained any tube casts. Temperature remained normal throughout, and the pulse gradually increased in fulness and tension.

Patient left Hospital on 21st January, blood corpuscles numbering 2100·000 per cubic millimetre.

Case of Placenta Prævia.

Mrs A., aged 32, admitted January 18th, seven and a half months pregnant, complaining of floodings. Married eight years; had four children, and one miscarriage at the third month. Last child was born in February 1889; lived only ten weeks.

On three occasions during the five weeks before admission patient had had floodings. On January 18th while in bed she had a sudden very profuse bleeding, much worse than any of the previous. She was then seen by the house-surgeon at her own home.

On vaginal examination the os was found dilated to about the size of a shilling, and through it the placenta could be distinctly felt occupying the lower uterine segment. Bleeding had stopped. Vagina was plugged and patient removed to Hospital on the 19th January.

On admission she was pale and very weak from loss of blood. The vagina was douched and then packed with a large hydrostatic dilator. Bleeding again came on at 11.45 P.M.; the os was accordingly plugged and dilated with Barnes's bags, the three sizes being

used in turn. At 3 A.M. on the 20th, the os being nearly fully dilated, podalic version was performed by the house-surgeon, and one leg of the child brought through the placenta, which was situated almost centrally over the os. The child being small and labour pains very strong, the breech and body were born in about five minutes, and the head then delivered according to Smellie's method. Following the birth of the child there was a very profuse hæmorrhage, so the hand was again passed into the uterus and the placenta extracted at once. The uterus contracting but feebly, a hot intra-uterine douche was given, ergotin was injected hypodermically, and the bleeding then stopped.

The child was still-born but successfully resuscitated. It weighed 5 lbs. 4 oz. and was 17 inches in length. It seemed very weakly, so was put in the incubator and reared thus for a week. After this it had so far revived as to be able to take its mother's breast. After delivery the mother was somewhat collapsed from the loss of blood. Stimulants were freely given and she soon revived. She remained weak for two days, but after this rapidly gained strength. She left the Hospital on the thirteenth day. When seen ten days after, mother and child were both doing well.

Case of Eclampsia.

M. M., primipara, æt. 19, six months pregnant. No history of scarlet fever or any previous illness. During the early months of pregnancy complained of headaches, and early in December her mother noticed a puffiness of the eyelids, which passed off in the course of the day. On Friday, 29th December, she suffered from a severe headache, and during the following night vomited a great deal of bile-stained fluid. At 9 A.M. on December 28th she had a severe eclamptic fit followed by coma, and up to the time of death she never regained consciousness. She was admitted to Hospital at 1 P.M. Up to that time she had had three fits.

On admission patient was comatose. Breathing stertorous, 40 per minute; temperature, 98°; pulse small, 120; face swollen, and slight general œdema; pupils equal and contracted. The fundus uteri extended to the level of the umbilicus.

P.V.—The os was soft and slightly dilated. Two ounces of urine were drawn off. It was found to be loaded with albumen, and tube casts were abundant; slight trace of blood.

Patient was placed at once in a hot pack. Two minims of croton oil were administered by mouth; pilocarpine, $\frac{1}{6}$ gr., hypodermically, and chloral, 40 grs., by rectum. Hot digitalis fomentations applied to loins, mustard poultice over abdomen, and chloroform given whenever a fit came on. The fits recurred almost regularly every hour till 9 P.M. After this there were no more fits, but breathing became more laboured, patient more cyanosed and dropsical and profoundly comatose.

At 2 A.M. on the 29th Dr Hart ruptured the membranes, and at 3 A.M. a six-months' dead fœtus was born. Placenta followed in thirty minutes. There was very little hæmorrhage during the labour. Immediately after delivery temperature was 102°; pulse 120, almost imperceptible. About 2 more oz. of urine were drawn off. From this time patient got gradually weaker; her pulse at the wrist could not be felt at 6 A.M., and her temperature was 103°. At 9.35 she died during a slight convulsion. Immediately before death her temperature was 105°. Heart beats could not be counted on account of rapidity and weakness. No post-mortem examination of the body could be obtained.

Case of Puerperal Peritonitis following Gonorrhœal Salpingitis.

M. B., i.-para, æt. 18, admitted to the Maternity Hospital on 24th November, at 1.30 A.M. Labour pains, she said, came on at 12 o'clock midnight. On examination it was found that the breech was born and that only the head required delivery, which was easily effected by Smellie's method. The placenta followed soon after. The vagina was carefully douched, but it was not considered necessary to stitch the slight tear that had taken place in the perineum. The child was still-born, but was successfully resuscitated.

History.—Patient had been in the Royal Infirmary, Edinburgh, for ten weeks, suffering from a chronic affection of the left knee-joint, which was diagnosed as gonorrhœal rheumatism. (No definite history, however, of an attack of gonorrhœa could be got from the patient.) She had complained for some time of pain in the right side, and during the last few weeks of her stay in the Infirmary she had had a rapid pulse and her temperature frequently rose to 102°, and even 103°, notwithstanding the fact that the condition of the knee was improving.

Puerperium.—*Nov.* 25.—Patient complained of pain. Morning temperature, 98°; evening, 99°·8. Morning pulse, 90; evening, 96. Lochia slightly offensive; bowels moved freely.

Nov. 26.—At 12 noon patient had a rigor, temperature rising to 103°, pulse 114. Complained much of pain in the right iliac region, where there was marked tenderness on pressure. Uterus washed out. Ordered brandy, ʒss. every four hours, and a mixture containing digitalis, quinine, and iron; hot fomentations locally.

Nov. 27.—No better. Lochia quite sweet. Temperature, 103°; pulse, 132.

Nov. 28.—Uterus was washed out morning and evening, which caused considerable pain. *P.V.* there was marked tenderness and slight fulness in the right fornix. There was slight abdominal distension. Hot fomentations replaced by ice bag, which relieved the pain. Opium, 1 gr. every four hours. Temperature, 103°·4; pulse, 120.

Nov. 29.—10 A.M.—Distension considerably increased; tempera-

ture 102°, pulse 123. 4 P.M.—Dr Hart saw the case in consultation with Professor Simpson, when patient's condition had somewhat improved. Towards evening temperature rose again to 103°·6, pulse 134.

Nov. 30.—At 11 A.M. Professor Simpson opened the abdomen and found the peritoneum acutely congested with a flaky deposit here and there. The right Fallopian tube was much thickened, inflamed, and enlarged, and in the pouch of Douglas about 3 ounces of sero-purulent fluid were found. The peritoneal cavity was freely irrigated with boiled water, and a drainage-tube having been inserted, the wound was dressed. Patient was somewhat collapsed after the operation, but soon recovered. She was put on brandy, digitalis, and opium.

Dec. 1.—Had a fair night; slept a good deal. 10 A.M.—Seemed better; pulse 120, temperature 102°. Towards evening got much worse, and gradually sank, dying at 3 A.M. on 2nd December.

Permission was obtained for a post-mortem examination of the pelvic organs, which Dr Wright kindly did for us. There was matting together of all the pelvic organs. This was most marked around the right Fallopian tube, which was found to be greatly dilated, thickened, and inflamed. There was no pus in the tube. The uterus was normal, except for the inflammation on its peritoneal surface. The conditions seemed to verify the diagnosis that had been made before laparotomy was performed, viz., that there had been a pyo-salpinx on the right side, that during labour some pus had escaped, and set up a local peritonitis which later had become general, and caused death.

Extern Cases.

During the quarter 164 women were treated at their own homes. Of these 25 were primiparæ, 139 multiparæ.

Classification of Labours.—Natural, 140; laborious, 8 (instrumental 4, lingering 4); preternatural, 5; complex, 5; abortions, 6; total, 164.

Presentations.—(1.) Cephalic, vertex, 154. (2.) Pelvic, breech, 7.

Positions.—(1.) Vertex cases, L.O.A. 149, R.O.P. 5. (2.) Breech cases, L.S.A. 4, L.S.P. 2, R.S.A. 1.

Instrumental Labours.—In 3 cases forceps were applied for exhaustion and inertia in the second stage, and in 1 case for persistent R.O.P. Forceps were also applied in two of the complex labours—once for prolapsus funis seen too late for turning, and once in a case of twins.

Preternatural Labours.—All were breech cases. In 3 the child was born dead.

Complex.—Three were cases of twins; one a case of prolapsus funis; one a case of eclampsia, afterwards sent to the Hospital, and detailed above. In one case of twins both presented by the

head and were delivered by forceps; in another the first was a vertex R.O.P., the second a breech L.S.P.; in another both presented by vertex L.O.A., and were delivered naturally. The case of prolapsus funis was seen too late by the house-surgeon; forceps were applied, but the child was born dead.

Abortions.—2 at the third month, 2 at the fourth month, 2 at the 4½ month. In 5 of these part of the placenta and membranes had to be removed from the uterus artificially.

Adherent Placenta.—The House Surgeons were summoned to 9 supposed cases of this, but in every case it was removed by Credé's method.

Sex of Children.—83 males, 79 females.

Mortality.—Maternal, 1, from septicæmia. The patient was seen by the House Surgeons only when moribund. The student in attendance seemed to have conducted the labour with all due care, but the patient's surroundings were most unfavourable. Fœtal, 12: One was the first of twins; 3 were breech cases; 1 was putrid; 1 was in the case of prolapsus funis; 2 were premature; 4 cause not assigned.

Meeting VIII.—June 11, 1890.

Dr Berry Hart, *President, in the Chair.*

I. *Dr Brewis* showed—(1) Trélat's vaginal speculum. The speculum is a self-retaining one, and is easily introduced. After the instrument is passed the blades are made to separate by means of two screws, one of which, the anterior, moves the front blade along a grooved bar, and presses back the anterior vaginal wall, while the posterior screw causes the posterior blade to rotate round an axle joint in such a way as to make the tip of the blade recede behind the vaginal portion. When the blades are separated an excellent view of the vaginal portion is obtained. In this respect it resembles Cusco's speculum, but differs from it in that it gives more room at the mouth of the instrument for operative manipulations. The advantages of Trélat's speculum are, that it is easily passed, is self retaining, gives a good view of the vaginal portion, and also gives room at the mouth of the instrument. Its disadvantages are that the blades hide the vaginal walls, and prevent the vaginal portion from being pulled down to the vulva. In point of usefulness, Dr Brewis thinks it ranks next to Sim's. 2. A parovarian cyst in which a large portion of the cyst wall had disappeared by thinning, so that only the peritoneum was left. The specimen showed that had it not been removed it probably would have cured itself by rupturing. It was not possible, however, to diagnose it from an ovarian cyst before opening the abdomen.

3. An ovarian tumour, combining the characters of an ovarian and a parovarian cyst. The upper portion consisted of a large monolocular cyst, covered with peritoneum, and had the Fallopian tube spread over its surface; while the lower part of the tumour was semi-solid. The tumour apparently grew from the hilum of the ovary.

II. *Dr Berry Hart* (President) in opening a discussion on placenta prævia, said,—

I have no intention at present of going fully into the question of the Pathology and Treatment of Placenta Prævia. It is hoped that we may have an expression of opinion on this subject from many of our Fellows, and it would defeat the primary object of the discussion were I to occupy an undue amount of our time in a prolonged introduction. My object will rather be to state what I believe to be the modern standpoint in this important question, giving the most recent advances in pathology, as well as indicating the safest and most rational treatment, so far as this can be done in the varying cases one meets in actual practice.

In regard to the pathology of this condition, I have no doubt that the increase of accuracy in our knowledge as to the lower uterine segment and the publication of the sections of Winter, Hofmeier, and Kaltenbach, have been of the greatest service in making matters plain. While we owe much of this knowledge to Germany, it should be noted that as early as 1863 Dr A. S. Donkin of Newcastle-on-Tyne enunciated the doctrine very clearly, and pointed out that a short zone of the body of the uterus adjoining and close to the cervix behaved passively during labour; and that Farre and Matthews Duncan contributed materially to our knowledge many years ago. In treatment, too, as we shall see, we are also indebted to a distinguished member of the London School, Dr Braxton Hicks.

We are now able to divide the full time uterus into three parts, viz., cervix, lower uterine segment, and a retracting or active portion above the latter. The second is usually $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, and is characterized not only by its lamellar structure, but also by a loose attachment of the peritoneum. This looseness is very apparent in front in labour and puerperal sections, where it is shown in a way one might almost characterize as diagrammatic. It is best demonstrated by thin celloidin sections. We have, therefore, now a great precision of definition in regard to the position of the placenta, a precision much needed in English and foreign text-books. *The placenta is normally placed only when it lies above the level of the lower uterine segment: placenta prævia is the condition where part of the placenta dips into the lower uterine segment: while the so-called accidental hæmorrhage is hæmorrhage from separation of the placenta, when it is in its normal position*, i.e., *attached to the uterine wall above the level of the lower uterine segment.*

No accuracy in our knowledge could be had so long as it was believed that the prævial portion of the placenta lay in a zone which did not differ from the uterus above it, *i.e.*, retracted actively during the pains.

Our knowledge of the etiology of placenta prævia is confessedly imperfect, and what we do know as yet is rather in the way of association, and not necessarily causal. One interesting point has recently been brought out by Hofmeier and Kaltenbach, viz., the relations of the decidua reflexa to placenta prævia. In regard to the decidua reflexa we do not know as much of its development as we would like, although interesting results are being got in its comparative development. Even in the earliest human pregnancies examined, it seems to have grown round and shut off the ovum, and apparently limited the ultimate excessive development of the chorionic villi to the placental site, *i.e.*, it appears normally to prevent the formation of a diffuse placenta. Now in placenta prævia, where we have the placenta overlapping the os internum, Hofmeier believes that the placenta has in part developed over the reflexa: were it not so we should in such a case get only chorionic villi over the os internum. In his specimen, which was that of a four months' twin pregnancy, this development can be distinctly seen, and the decidua reflexa with placenta developed on it is separate from the decidua vera for about half its length. Kaltenbach has confirmed this in another specimen, and urges that we may define the placenta as prævia when it develops in the lower segment of the reflexa. This seems to me no adequate definition unless it can be shown that the reflexa springs below from the level of the upper boundary of the lower uterine segment. Hofmeier and Kaltenbach discuss several interesting questions on this point, but it is unnecessary at present to consider these. I may urge, however, that in Kaltenbach's preparation and one of Hofmeier's, both at the second month, the placenta is large relatively, and it is quite conceivable that ultimately the growing uterus would carry placenta away from the lower uterine segment, and the placenta thus cease to be prævia.

In regard to the question of blood circulation in the maternal portion of the placenta and uterine wall, the recent researches of Waldeyer have quite confirmed those of Sir W. Turner. Minot, a recent able writer on the placenta, considers Farre's description to be still one of the best on this head. Hofmeier has also shown that in placenta prævia the normally meagre supply of direct arterial branches to the lower uterine segment is not increased in placenta prævia, while the venous circulation is markedly so. This last I can confirm from a preparation where the veins of the lower uterine segment are greatly increased. In regard to the mechanism of separation, nothing has been distinctly added to Duncan's clear description in 1873. The bleeding from separation is mainly venous, and the stretching of the lower uterine segment

compressing these veins and the greatly thinned out arterial vessels, practically capillaries, must be a factor in arresting hæmorrhage, which, as we know, is almost entirely uterine. I need not at present delay to discuss Bayer's views, as he admits that there is a certain number of placenta prævia cases where the cervix remains intact, but urges that in others the hæmorrhage in the later months is due to an unfolding of the upper portion of the cervical canal.

Passing on now to the question of treatment, I have first to remark that the multifarious recommendations on this head must be weeded by setting up a standard to which any method must attain before it can be considered as safe or one to be recommended. The last standard I would recommend would be the statistical, as one can never exclude the possibility that the patient may have recovered in spite of the treatment. The criteria I would lay down are as follows. Any treatment of placenta prævia must conserve blood to the utmost. The obstetrician has always to remember that the worst bleeding may come after delivery, and if he has not conserved blood most carefully, the patient may sink from this later loss. Then the treatment should be one that avoids prolonged interference, that admits of thorough antisepsis, interferes as little as possible with the patient's convenience, and, above all, that puts the mother's safety first, and that of the fœtus in a very secondary position. Thus I would exclude the repeated use of the vaginal tampon, as recommended by Auvard and others; any prolonged use of Barnes's dilators, though to a limited extent they are of the greatest value; and any rapid delivery through an imperfectly dilated genital tract. While no one treatment can be recommended as applicable in all cases, I would urge that when a patient has begun to lose blood definitely, chloroform should be given, the cervix dilated to admit two fingers, bipolar version performed, and a foot brought down. The case should then be left to terminate as a footling in its own time. The advantages of this method are, that it takes the minimum of time and interference, secures absolutely against further loss of blood, and enables the attendant to stimulate the patient for any risk yet to come. The rupture of the membranes, unless in minor cases, I would deprecate. Of course it helps to arrest hæmorrhage, owing to the fact that the blood supply to the upper portion of the lower uterine segment passes through the lower portion of the actively retracting part, but it hinders version, and thus may cause a greater loss of blood than what it at first prevented.

As to the plan of complete dilatation with Barnes's bags, followed by rapid delivery, I have come to the conclusion that it increases the chances of the child's life at the risk of the mother's safety. The slow delivery need not specially endanger the child's life, avoids laceration of the mother, and, by allowing thrombosis, promotes the arrest of secondary venous hæmorrhage from the lower uterine segment marvellously.

I have now to speak briefly on the means of stimulation to be employed in ordinary cases. I would place in the first rank the repeated subcutaneous injection of sulphuric ether. The patient should be encouraged to drink plentifully, though slowly, of hot water, so as to increase the fluid in the vessels. I prefer hot water alone, as there is less chance of sickness and consequent loss by vomiting. If sickness is present, fluid enemata may be given. In a bad case, where hæmorrhage has been profuse before help arrives, autotransfusion by bandaging the limbs should be at once had recourse to. As to the question of venous transfusion, even by the safe and easy method we owe to Drs Cotterill and John Duncan, one's feeling always is, Is it necessary at present? We wait for indications, and while we wait our patient may suddenly sink. One is in a dilemma, anxious not to be fussy, and yet afraid to be too late. Have we, then, any means of transfusion which we may use, not because so much blood has been lost that we fear for the patient's life, but because we are afraid that further loss may endanger her safety? Now such a method, I believe, we have in the subcutaneous transfusion described by Münchmeyer. This method is simple, safe, and effective in cases where the loss of blood is not too great. It consists in the transfusion into the subcutaneous tissue in the infraclavicular or interscapular regions of a 0·6 per cent. salt solution at 100° F. The apparatus need consist only of a funnel, a few feet of india-rubber tubing, and a hollow aspiratory needle such as all practitioners have. This apparatus is sterilized with hot water, the funnel and tube filled, and the needle passed into the tissue. The funnel being held up, the solution passes in by gravitation, and is then massaged by the hand through the tissues. In this way several ounces can be passed into the circulation, and the bulk of blood increased. This is of great importance, as often there is not sufficient blood in the body to overcome the elasticity of the aorta, and thus the blood is not distributed over the body, owing to the collapse of the main arteries. There is blood in the body, but it is not available.

One final point in regard to treatment. I have already alluded to the risk of *post-partum* hæmorrhage. This may come from the lacerated and oozing lower uterine segment. In such, if pressure and the hot douche fail, the practitioner can fall back on the iodoform gauze tampon as an addition, but not a substitute, to all means securing vigorous uterine retraction.

My personal experience of placenta prævia has been limited to twelve cases, with a maternal mortality of one, *i.e.*, about 8 per cent. Three of these were very desperate cases, as the patients had lost a large amount of blood before I saw them. The fatal case was one of these three; and I regret I took too long to dilate, so that the patient sank rapidly before the transfusion apparatus was ready. In one bad case afterwards, the subcutaneous injection was attended with the best possible results.

The subcutaneous transfusion has great advantages both in hospital and private practice. In hospital there should always be a flask of sterilized salt solution ready; and in cases of hæmorrhage sent in or occurring in the hospital, the house-surgeon, in addition to the use of ordinary remedies, can at once begin this form of transfusion, and thus save the time often lost while the physician is being summoned. Then in private practice the attendant can rapidly prepare simple salt solution at a temperature of 100° F., and with the simple apparatus mentioned, rally his patient. Where the loss of blood is profound, it will probably be better to use venous transfusion of the solution of blood and phosphate of soda recommended by Dr John Duncan.

In conclusion, we can now confidently say that the resources of the obstetrician in treating placenta prævia are in every way adequate, and that in cases seen in time the maternal mortality should be low. The mortality formerly ranged as high as 40 *per cent.* In the Berlin klinik it was 7·2 (Hofmeier), practically the average of my own cases; whilst Veit records twenty-five cases, with one death. I have no doubt that this mortality will ultimately be improved on. To this end there is needed, in my opinion, the strongest recommendation to the practitioner, of thorough antisepsis, early interference by Hicks' bipolar version, an avoidance of hasty delivery after turning, and the full utilization of the various means of stimulation prior to the end of the second stage.

Hofmeier.—*Die menschliche Placenta.* Wiesbaden, 1890.

Kaltenbach.—"Zur Pathogenese der Placenta Prævia," *Zeitschrift der Geburtshülfe*, Bd. xviii., Hft. 1.

Münchmeyer.—"Ueber den Werth der subcutanen Kochsalzinfusion zur Behandlung schwerer Anæmie," *Archiv für Gynäk.*, Bd. xxxiv., Hft. 3.

Professor Simpson said the subject had been brought before them in a very lucid and interesting manner, and the President had earned the gratitude of the Society for his paper, and especially for his exposition of the recent observations on the anatomical relations of placenta prævia. He (Prof. Simpson) agreed with Dr Hart that it was not necessary in every case of placenta prævia to suppose, with Hofmeyer and Kaltenbach, that the implantation was always due to development of vessels in the reflexa, though good grounds had been given for believing that such an explanation held good for some cases. The kind of treatment that Dr Hart had sketched was good for what Dr Hart had probably set before his mind as a typical case. But it had to be borne in mind that the general practitioner might have to do with a great variety of conditions requiring different methods of treatment. He might find a case at the sixth month with undilated cervix and uncontracting

uterus; or it might be at the full time with the cervix expanding and the uterus in full action. Now in the latter condition, to which a practitioner might be called without having any premonition of the complication he had to deal with, perhaps he might be able to help his patient by an expedient which Dr Hart had left out of consideration altogether, namely, the separation of a lobule or two of the placenta. He (Prof. Simpson) had found this treatment in such circumstances give perfectly satisfactory results, producing a temporary arrest of the hæmorrhage, and allowing of the expansion of the cervix to a degree sufficient for the extraction or expulsion of the child. The points on which Dr Hart had insisted as of special moment,—such as avoidance of delay, care in the prevention of laceration of maternal structures, and antiseptic treatment of the cavities, were all of the greatest importance; and Dr Hart had done well in calling attention to the special tendency to the danger of hæmorrhage in the third stage or post-partum, all the more that this was a danger in placenta prævia cases not sufficiently insisted on in text-books. The cause of the third stage hæmorrhage might have various explanations,—such as the flaccidity of the passive portion of the uterus to which the placenta was attached, the tendency of the endometritic state which have caused the bad implantation of the placenta to cause also morbid adhesion of it, or the fact that the main placental mass lay below the influence of the contractions in the active portion of the uterus. As regards the methods of resuscitation in cases where bleeding patients were getting faint, it was always difficult to determine the value of transfusion of blood; but in the ordinary run of obstetrical cases, its employment lay outside the means at the disposal of the general practitioner, and it was an important service that Dr Hart had rendered them in showing the value of Münchmeyer's saline infusions, which should always be easily available. It was also to be borne in mind that in such circumstances hypodermic injections of ether or brandy often gave most satisfactory results, and it was always important to promote uterine contraction by hypodermic injections of ergotin.

Dr A. H. F. Barbour thought that while the definition of placenta prævia proposed by the President was the best one that had been given, there was this difficulty with regard to it, that the limit of the lower uterine segment was not well marked on the lateral and posterior walls. The firm attachment of the peritoneum was only present as a well-marked line anteriorly, and the sudden transition from a thick to a thin portion was not so well marked in the posterior wall as in the anterior one of the various post-partum uteri he had examined. Until we know more about the retraction-ring all round, there was difficulty it using it in defining placenta prævia. As to treatment, he had hesitation in speaking as he had seen only a few cases. He wished to know whether the line of treatment recommended by the President would

exclude rupturing the membranes, because he thought we must emphasize the advantage of it for cases of marginal placenta prævia. In three cases of marginal placenta prævia he had tried it, and from the moment of rupture the bleeding stopped. It acted by allowing the presenting part to come down as a plug; and also, according to Schroeder, by allowing the placenta to go back with the retracting uterine wall instead of separating from it.

Dr James Ritchie had not yet heard a theory of the mode of production of placenta prævia which commended itself to him. As regards treatment, his experience had not been large; he had not met with a case of complete placenta prævia, but in partial cases, in which the os was considerably dilated, he found that by separating with the finger a portion of the placenta, which he pictured to himself as being on the stretch, the hæmorrhage was temporarily arrested, although previously it had been frequent and profuse. In such a case if the head presented he ruptured the membranes, and allowed the head to come down as a plug on the bleeding portion. In cases in which the os was not dilated he believed that the mode of proceeding advocated by Dr Berry Hart was the proper one. He was glad to have the President's experience of Münchmeyer's method of saline transfusion. He had lost one patient from post-partum hæmorrhage—a case of uterine tumour. Although he had frequently had anxiety, he had found subcutaneous injection of ergotin with early use of hot water douche sufficient in post-partum hæmorrhage. The case of tumour referred to was in a very delicate patient, and the amount of blood lost was not absolutely large.

The President thanked the Fellows for their appreciation of the way he opened the discussion. His intention was, of course, not to enlarge on elementary points in treatment.

III. *Dr Thomas Wood* read his paper entitled EXPERIMENTS ON THE FŒTUS, AND THEIR BEARING ON ITS ATTITUDE IN UTERO.

Prof. Simpson thought Dr Wood had made a very praiseworthy effort to arrive at a solution of the cause of the preponderance of head presentations over all others, although all his observations did not quite coincide with the old gravitation theory which he had been led to adopt. It always seemed to him (Prof. Simpson) that that theory failed to account for the persistence of such presentations in cases where gravid women lay long on one side with the fundus as low as or lower than the cervix uteri. Dr Wood would need to multiply his observations to make them really valuable; for it had been shown many years ago, that in children born dead as breech presentations the specific gravity of the lower part of the trunk had been found the greatest, showing that the greater specific gravity of one or other pole of the fœtus might be an effect and not a cause of its presentation in labour. No doubt the vitality and active movements of the fœtus played an im-

portant part in the assumption and maintenance of the commonest presentation. Meeh had shown that the movements of the lower limbs would be mainly influential in determining presentations: that the effect of their impingement on the uterus towards the fundus would be mostly lost on the yielding walls in a head presentation, whilst in a breech presentation their impingement through the soft walls of the uterus on the pelvic bones would tend to bring about a spontaneous version.

Dr J. C. Webster said that he did not believe clinical evidence would support Dr Wood's experimental conclusions. It is not uncommon in abortions and miscarriages to find cephalic presentations. In three cases seen by him during the past few months this was the condition. According to Dr Wood's theory such an occurrence should be very rare. He believed, on the contrary, that in the early months, before the commencement of fœtal movements, cephalic presentations were most common. In the early weeks, judging from cases in which the uterine contents have been expelled entire, it seems very probable that the fœtus lies in the amniotic cavity with the head below the level of the breech. One is struck, in examining these specimens, by two things, viz., the shortness of the cord relatively as compared with its condition at full time, and also its nearer attachment to the symphysis of the fœtus. These two factors must undoubtedly cause the fœtus to be suspended with the head below the breech, except in those cases of abnormally low implantation of the placenta. Thus a tendency to grow head downwards might be impressed upon the fœtus, and might continue throughout its life *in utero*.

Dr James Ritchie said that if the specific gravity of the fœtus is one cause of the position it ultimately assumes at full term, there must be another factor, because, although near the full term the head is found lowest more frequently than at an earlier date, yet frequent examination shows that even up to the onset of labour there may be a frequent change in position of the child.

Dr A. H. F. Barbour said that Dr Wood must be congratulated on his maiden contribution to the Society's work. He objected, however, to the statement that frozen sections show that the long axis of the uterus corresponded to the axis of the brim of the pelvis when the patient was recumbent. The uterus took this position when a contraction was present, but in the interval between pains its long axis was more nearly parallel to the spinal column. He was also inclined to think that, while removed from the body the uterus was globular, in the body it had the shape which Sir James Y. Simpson described, viz., that of an ovoid with the narrow end downwards. He would recall also a passage from Hunter, where he describes the fœtus as "adapted to the circumstances of its habitation," as showing that Hunter held that the shape of the uterus influenced the position of the fœtus. A cast that he (Dr Barbour) had recently made of the fœtus, taken out of the

uterus at the eighth month of gestation in which the breech presented, this being from the peculiar attitude of the limbs the smaller end of the ovoid, was in favour of Sir James Simpson's as against the gravitation theory.

Dr Wood replied that Dr Simpson had raised the old objection, namely, the horizontal position, but that did not in the latter months raise the centre of gravity of the fœtus in utero, and make its position unstable. The centre of gravity, which is nearer the cephalic pole, still lies as low as it can possibly be in the uterus, and therefore it is still in stable equilibrium, and for this reason the fœtus has no tendency to shift its position on account of gravitation; in fact this is in accordance with gravitation and not the reverse. Then Dr Barbour had mentioned the shape of the uterus. He (Dr Wood) had no doubt that it was ovoid in shape normally, but he still thought that its shape was not so sufficiently determined or rigid as to cause the fœtus to adapt itself to it independently of the laws of gravitation. Hunter, he was sure, distinctly inclined to the gravitation view. Then with regard to the short cord suspending the fœtus, it was noted by Scanzoni in his paper on the subject, that in the very early stages the fœtus was suspended by the cord, but that did not affect what he had said, because he had been speaking of the period when the cord was sufficiently long to enable the fœtus to present with any part. Hunter, he thought, showed that the cord by about the tenth week was so long, that instead of running straight from the fœtus to the placenta it was loosely twisted up. Regarding what Dr Ritchie had said, he would just simply remark, that he started those experiments with views similar to his, but had to give them up, because he found the position not so tenable as the one he had now taken up.

Meeting IX.—July 9, 1890.

Dr Berry Hart, *President, in the Chair.*

I. *Dr Underhill* exhibited the PLACENTA FROM A CASE OF TRIPLETS. There were two placentæ connected together by a narrow line of the membranes, but quite distinct from one another. The fœtuses were each contained in a separate bag of membranes. Two were females and the third a male. The male and the larger of the two females were attached to the larger placenta; the other female to the small placenta.

II. *Dr Halliday Croom* showed—(1), some PHOTOGRAPHS of a case

in which the Porro-Cæsarean section was performed; (2), A FIBRO-CYSTIC TUMOUR OF UTERUS; (3), PAPILLOMA OF OVARY.

III. *Dr F. J. Baildon* read his paper on A CASE OF ENCEPHALOCELE. On November 22nd, 1889, he was called in by Dr A. Jones of Southport to assist him in the following case:—Mrs M., aged 38, had had five children previously, all healthy. She had had pain for twenty-four hours, and on examination he found the os uteri fully dilated, the head presenting in the first position. Dr Jones gave chloroform, and he applied Simpson's long forceps, having some difficulty in locking them, and more in delivering the head. Attached to the head at the nape of the neck was a large cyst, which he now exhibited. The pedicle was thick, measuring 10 centimetres in circumference. The cyst, when supported by a flat surface, measured 17 × 15 centimetres. The walls were thin, and at one part had been pressed either by the forceps or against the pelvic brim, and a piece the size of a florin was red and dusky. The child in other respects was a healthy female. On November 24th it was evident that the portion of the cyst was sloughing, and they had to attempt its removal. Dr Jones again requested his assistance. They first tapped the cyst, and drew off about 20 ounces of bloody fluid; then passed an armed needle through the pedicle, and tied it in two pieces, and cut it off. In spite of the ligature the hæmorrhage was considerable, and they could only get it checked by touching the stump with solid nitrate of silver. The child had no convulsions at the time, nor could they detect any imperfection in the occipital bone. On the 25th the bleeding again commenced, and Dr Jones had much trouble in stopping it, and on the 26th the child had a convulsion and died. The mother made a good recovery. No post-mortem on the child was allowed, but no doubt a small communication existed between the cyst and the interior of the head, and the case was probably hopeless from the first.

MEETING X.—JULY 16, 1890.

DR BERRY HART, *President, in the Chair.*

I. *Prof. Simpson* showed a specimen which he had received from Dr Robert Wise of Kendal. It consisted of a PREMATURE STILL-BORN FŒTUS, which had presented by the shoulder, and which had been expelled spontaneously. The placenta was partially prævia.

II. *Dr Haig Ferguson* exhibited—(*a*) a MULTILOCULAR OVARIAN TUMOUR, which he had removed some time ago. The tumuor

presented the ordinary characteristics of such growths. The clinical history of the case was of some interest, as the patient, an unmarried woman, sought medical advice for abdominal pain, and not for abdominal swelling, although the tumour nearly filled the abdominal cavity. Her menstrual periods were profuse, and very frequent. On examining the abdomen there was no difficulty in diagnosing the tumour, and making certain of its ovarian origin after a vaginal exploration. The interesting point was that the patient complained of great pain when the abdomen was palpated, and distinct friction fremitus could be felt during each respiration, while friction could also be heard on auscultation. The patient had felt the pain for some weeks. When she was put to bed the temperature was found to be raised three degrees, and the question came to be, Should the operation be delayed till the peritonitis had subsided and the temperature had fallen, or should it be done at once? Dr Ferguson inclined to the latter view, as he feared the formation of difficult adhesions after the subsidence of the inflammation. He accordingly operated at once, and found that there were no adhesions. The serous covering of the tumour anteriorly was much congested and covered with innumerable highly injected spots, and the apposed parietal peritoneum was in the same condition. There was no twisting of the pedicle. The tumour was easily removed, and the patient made an uninterrupted recovery. There could be little doubt that had the operation been delayed till the feverishness had subsided, numerous adhesions would in all likelihood have formed, which would have rendered the operation much more dangerous and difficult. (*b*) The OVARIES and FALLOPIAN TUBES, which he had removed by abdominal section about three weeks ago, from a patient who had suffered for many years from severe premenstrual pain, which had resisted all ordinary treatment. The patient was married and sterile. She likewise had an interstitial uterine fibroid, about the size of a three months' pregnancy, which for the last two years had been the cause of steadily increasing menorrhagia and metrorrhagia. Her strength was thereby greatly reduced, and to add to her complications she suffered from cardiac dilatation with mitral incompetence. She was still far from the menopause, and in order to prevent her rapidly failing health from altogether giving way with the pain and hæmorrhage, prompt treatment was called for. No difficulty was experienced in the removal of the appendages, and the patient has made an excellent recovery. The Fallopian tubes were greatly congested and tortuous, and one of them had a double fimbriated extremity, showing congenital malformation.

III. *Dr Armour* exhibited for Dr Halliday Croom—(*a*) Two PAPILLOMATOUS CYSTS OF BOTH OVARIES, from a case operated on by Dr Croom on the 11th inst. The interesting point about the case was the fact that the patient came to the ward in April last,

and was found then to have a fibroid tumour of the uterus, about the size of a five months' pregnancy. She was at that time after examination sent home as unsuitable for operation. A few weeks ago she returned, and was found to have in addition to the fibroid the tumours shown, along with copious ascites. The operation was easy and successful. (*b*) Two GALL-STONES from a case in which Dr Croom performed cholocystotomy. The gall-bladder was small and contracted, and the case could not have been diagnosed had it not been for the recurrent attacks of severe biliary colic and evanescent jaundice that were present. It is noticeable that, though only two stones were found, each of the stones had numerous facets.

IV. *Dr Underhill* exhibited a specimen of RUPTURED UTERUS. This specimen was obtained from a case which occurred in the Maternity a month since. On discovery that the uterus was ruptured, Dr Underhill determined to perform laparotomy. With most valuable advice and assistance from Prof. Simpson, he opened the abdomen and removed the fœtus and placenta from among the intestines. Finding that the tear in the uterus extended from near the origin of the left round ligament to beyond the middle of the cervix, he sewed up with catgut the lower part of the tear, then passed an elastic tube round the upper part of the cervix, and passed two knitting pins through it at right angles, in the manner employed by Mr Lawson Tait. The uterus was then cut off, the abdomen very carefully cleansed with boiled water and sponges, and the incision sewn up. There was some rise of temperature for the first three days, but the woman had now recovered. The stump came away on the seventh day.

V. SOME POINTS IN THE MORBID ANATOMY OF THE FALLOPIAN TUBES.

By F. W. N. HAULTAIN, M.D., F.R.C.P.E., Physician for Midwifery and Diseases of Women, Royal Dispensary, Edinburgh ; Gynæcological Tutor, Royal Infirmary, Edinburgh.

BEYOND being the occasional resting-place of an impregnated ovum, or the seat of fluid accumulations and malignant deposits, the pathology of the Fallopian tubes has been, until within the last twenty years, almost a blank, and it is not till within this time—thanks to Tait and others—that the clinical features of tubal disease have been recognised. Now, however, they occupy a position, both pathologically and clinically, second to none in importance to any of the female organs of generation.

The remarks which follow, therefore, are by no means intended to deal exhaustively with the subject, but merely to consider, in as concise a manner as may be, a few of the more common

affections of these organs, and to show specimens in illustration of these conditions.

The normal Fallopian tubes are, as is well known, placed one on either side of the uterus, from the upper angles of which they spring. Passing between the layers of the broad ligament outwards, backwards, and downwards in a wavy manner, they at their distal or free extremities embrace their corresponding ovaries in a loop, a relation first pointed out by His, but which is, unfortunately, not sufficiently emphasized, the diagrammatic butterfly wing arrangement of the broad ligament and appendages giving a most erroneous but more freely accepted relation of parts. The lumen of the tube varies greatly, being at its uterine opening merely sufficient to allow of the passage of a bristle, but it gradually expands towards its distal or fimbriated extremity, where it opens into the peritoneal cavity. It has been therefore simulated to a trumpet, but it seems to me to be more like a closed umbrella without the stick. Microscopically its walls are found to be formed by a muscularis composed of external longitudinal and internal circular fibres; while internal to these are a submucous and mucous layer with a muscularis mucosæ, the cavity being lined by a ciliated columnar epithelium. The mucous and sub-mucous coats are thrown into a number of longitudinal folds, more apparent towards the distal extremity. The mucosa itself also is extremely irregular in outline, so that on transverse section it presents an arborescent appearance; and passing into its branch-like processes one may generally find slips of muscular tissue (muscularis mucosæ).

The tube as a whole lies loosely between the layers of the broad ligament, being attached to the peritoneum by a very delicate and loose connective tissue. Its serous covering is thus easily stripped off, and specially so in the later months of pregnancy, which is a point of much importance to be afterwards noted. The lumen of the tube being continuous on the one hand with the cavity of the uterus, and on the other with the interior of the peritoneal sac, affords the only example in the body of a direct continuity between a mucous and a serous lined space.

From this continuity of its lumen with the endometrium it will be evident how likely it will be to share in the inflammatory affections of that membrane, and how it must be a connecting link towards a similar condition of the ovary and peritoneum. It may be inferred, therefore, that an inflammatory state of the tube is generally secondary to that of the uterus, but that it may have a *de novo* origin in a few cases is probable, but, of course, difficult, if not impossible, to substantiate.

The lesions of the tubes to which I specially intend to refer are of three varieties,—inflammatory, contortive, and combined varieties.

The inflammatory diseases of the tube may, I think, be generally

classified as of two varieties,—1st, inflammation of the lining membrane only, or endosalpingitis; 2nd, inflammation of the deeper structures (interstitial salpingitis).

Inflammation of the lining membrane of the tube may be, as in other epithelial-lined structures, catarrhal or purulent. The latter is merely an aggravated stage of the former, and the boundary line between them is impossible to clearly define. The minute pathology of the condition does not require to be gone into with detail, it being merely an example of the usual inflammatory process attacking epithelial structures, giving rise to excessive secretion from its surface, and advancing in severer cases to destruction of the epithelial cells and pus formation (pyosalpinx).

The milder variety is chiefly the result of extension of inflammation from an ordinary non-specific case of endometritis; while the purulent type, in many cases, is due to the direct upward spread of *acute* gonorrhœa (examples of which I shall mention later). Pyosalpinx is, however, undoubtedly the frequent result of septic infection after labour, and is probably also now and then directly traceable as a complication or sequela of the zymotic fevers. That the latent gonococcus of Noeggerath, or decrepit coccus of Tait, is such a fertile source of pyosalpinx, as some authors would have us believe, has, I think, like other parts of this theory, yet to be proved. Should the lumen of the tube remain patent, the secretion is apt to escape into the peritoneal cavity and give rise to inflammation of the surrounding structures—perimetritis, periovaritis, and ovaritis. This source of these secondary inflammations, though well known, is, I think, by no means sufficiently emphasized, though it commends itself as being the most likely cause of these common ailments.

If, though the canal be still patent, cure of the inflammation does not take place, the process may extend to the deeper structures of the tube, and thus give rise to the second type before mentioned, viz.,—

Interstitial Salpingitis. This, from the inflammatory exudation and formation of new connective tissue, gives rise to thickening of the tube wall, which, from the specimen I show you, reaches occasionally to a considerable extent. This thickening of the tube wall has, in the large majority of cases which I have examined, been largely confined to the mucous and submucous layers, the muscular coat participating only in a slight degree; in fact, in some cases it is entirely unaffected, and may, indeed, become attenuated from the expanding pressure of the hypertrophied submucosa. (See specimen, Fig. 1.) In some cases the muscular coat becomes infiltrated and thickened, a condition which is associated with degeneration of the muscular fibres.

FIG. 1. — Transverse section through hypertrophied tube. Muscular coat much attenuated. Muscle represented by dotted line. (From nature).

The epithelium, as a rule, in these cases is, as may be inferred, much changed and degenerated, but with the details of the minute morbid appearances I will not at present detain you.

Such then, briefly, are the varieties of inflammation of the tube itself. I have purposely left out the so-called perisalpingitis, which is nothing more or less than an inflammatory condition of the surrounding peritoneum, and comes more under the category of perimetritis. Naturally through it we have adhesions formed between the tube and surrounding structures—such as ovary, pelvis, etc.—which are of great clinical importance.

The lesion which now falls to be considered, and that more closely than the preceding, is *Contortion of the Tube.* This, as the name implies, is a twisting or bending of the tube itself, irrespective of inflammation or any other recognisable morbid condition. Its importance cannot be over-rated, for from it, and it alone, we must in a number of cases look for the distressing symptoms which have brought the patient under the operator's care, and it is undoubtedly, so far as I have seen, the most frequent morbid condition of the tube met with. In many cases, though by no means all, it may be shown to be associated with inflammatory processes, which are as a rule, however, external to the tube itself, and are probably secondary, and it is to the contortion of the tube that we have to look for an explanation of the distress and other symptoms from which the patient suffered. The contortion, as a rule, is a spiral angular bending, so that on making a longitudinal section of the entire tube its lumen will be found appearing at different planes, here cut longitudinally and there transversely (see specimen, Fig. 2 B), while at the angles it may be completely occluded from apposition of its mucous surfaces.

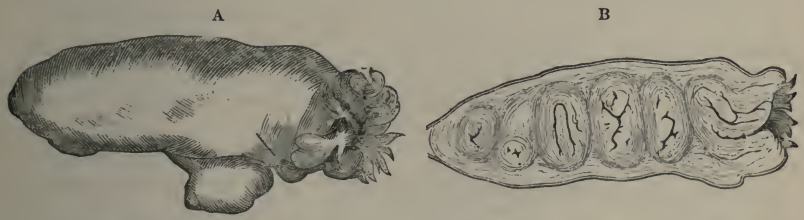

Fig. 2 A.—External appearance of much contorted Fallopian tube, with peritubal inflammatory thickening, giving appearance of uniform dilatation or thickening.

Fig. 2 B. Longitudinal section through same tube, showing lumen of tube cut at different planes and at six different points. The peritoneum can be seen running smoothly over surface. (From specimen.)

On microscopic examination the structure of the tube will be found to be in every way normal, the epithelium ciliated and walls in no way changed, except slightly thickened in some cases, while the peritoneum will be seen to run smoothly over its surface without dipping into the angles formed by the bending of the organ. The tube thus appears to be curled up between the layers of the

broad ligament like a snail within its shell. The external surfaces of the walls of the tube will be found in some cases in close apposition with almost no tissue between them; in others there may be some cellular connective tissue; while in those cases associated with severe surrounding inflammation there will be found a considerable amount of inflammatory connective tissue (Fig. 2).

To the naked eye, as is naturally to be expected, the tube is apparently shortened, and in some cases, from its smooth external surface, appears uniformly dilated or thickened (Fig. 2 A), an impression only to be corrected on section.

Here, then, we have a morbid condition of the tube of an extremely interesting nature, which alone can sufficiently account for those signs and symptoms, now so well known as indicative of disease of the appendages.

Sterility, the most important and universal sign of these conditions, must be present in these cases, where the tube is occluded at the angles of bending; and even in these cases where perhaps the occlusion is not absolute, sterility is yet to be looked for, because we know from the experience of flexions of the uterus that there is no more potent preventative to conception than angulation of the genital tract, such evidently proving an almost insuperable barrier to the passage of the elements of generation. Again, the constant pain in the side, aggravated at the premenstrual periods, may, I think, be satisfactorily accounted for by the congestion which is sure to be set up by the bending of an organ of such great vascularity, and in whose immediate neighbourhood such a large venous plexus is present (pampiniform plexus). Further, it is more than probable that the surrounding inflammatory conditions which so frequently are associated with this contortion of the tubes are often secondary to the contortion, being the result of congestion, and are not the primary factor in the disease, as is supposed.

The ætiology of this lesion is difficult of explanation, but some help towards its elucidation may be acquired if one considers the development of the organ.

Fig. 3. Normal uterus (U) and Fallopian tubes (T) of eight months' fœtus, showing spiral disposition of tubes. (From specimen.)

Before birth the Fallopian tube is in an exactly similar state to the lesion now being considered (Fig. 3), *i.e.*, it is twisted in a spiral manner (see specimen); and it is not till puberty, that by a gradual process of straightening it has acquired its normal undulating form.

Probably, then, this morbid condition of the tube may be in some cases a continuance of the fœtal state; but in the majority of cases it must be looked upon as a return to that con-

dition, because the most frequent and best marked examples are met with in women who have previously borne children. Curiously also it is in these cases, which from their history seem to owe their origin to the puerperal state, that we get the large majority of examples of the lesion; thus it would appear as if there was an inherent tendency in the tube after pregnancy to return to its fœtal state—a return which at first seems difficult to account for.

On examining, however, the Fallopian tube at full term, it will be found to have undergone a similar change to the uterus at that period, viz., hypertrophy (see specimen). This hypertrophy is almost altogether one of elongation, the tube at term being from 6 to 8 inches in length instead of 4 to 5 inches as normal.

That this is hypertrophy and not mere attenuation is proved, first, from the calibre of the tube remaining evidently constant, and, secondly, by the researches of H. Thompson of Dorpat, who, in a series of microscopic examinations of the tubes of pregnant rabbits, found the longitudinal muscular fibres individually to be hypertrophied and elongated to twice their normal length. They also were found to undergo a process of involution similar to that of the uterus.

From these interesting observations, then, one may naturally infer that if involution of these longitudinal fibres be incomplete or irregular, twisting of the tube will be the result,—its loose attachment to the layers of the broad ligament (as previously pointed out) offering little or no resistance to the tube curling up between them. On this I can at present only theorize, but the feasibility of such being the cause of the abnormality does not to me present an insuperable stretch of imagination.

In some cases, of course, I admit angulation of the tube is directly caused by the fixation and dragging of peritonitic adhesions; but the fact remains, that in a large number of cases no such adhesions are to be found, though the tube be curled and twisted to an advanced degree.

The statement that probably in many cases the inflammatory conditions of the tube so frequently found associated with its contortion is secondary to this contortion is supported by the clinical histories of a large number of cases, in which it will be found that the pain and distress of which the patient complained was of gradual onset, and was first noticed some weeks after she had risen from her confinement.

This is well illustrated in the history of the patient from whom the specimen I show you was removed.

Mrs S., aged 30, three children, youngest four and a half years, complained of constant pain in her side, much aggravated for two days before menstruation, and also during the flow. Pain commenced about two months after last confinement, and came on gradually; it is now, however, almost unbearable, and for two days

before her periods she is totally unfit to perform her duties, and is confined to bed. She has tried all forms of treatment without avail. After operation she was completely cured (Fig. 2).

If in a tube thus contorted we have set up secondarily an endo-salpingitis, the result will doubtless be retention of the secretion from the occlusion of the tube at its angles of bending, and we will thus have formed a hamato-, hydro-, or pyo salpinx, according to the nature of the secretion.

That this angulation of the tube is a cause of its occlusion in many cases I feel convinced; unfortunately, however, I have only had the opportunity of examining four cases of retained tubal secretion, but in two of these this undoubtedly seemed to be the direct cause. In support of this, if one looks at the drawings of a hydrosalpinx by Hennig or Boivin, what strikes one at once is an angulation at the uterine end of the tubal swelling. Again, if one reads the paper of Lewers "On the Frequency of Pathological Conditions of the Fallopian Tubes,"[1] one is struck by the number of cases of dilatation of the tube, filled with fluid contents, which communicated with the uterine cavity by a still patent undilated portion of the tube,—a condition which seems to be quite inexplicable, unless it be accounted for by this angulation being the cause of the retention, and its having been straightened out in the process of exploration by the probe or bristle. The specimen I place before you also shows that dilatation (*D*) has begun to take place exterior to a sharp bend in the tube, the distal extremity of the tube having become blocked by the adhesion of the fimbriæ to a blood cyst. The dilated portion was filled with watery fluid.

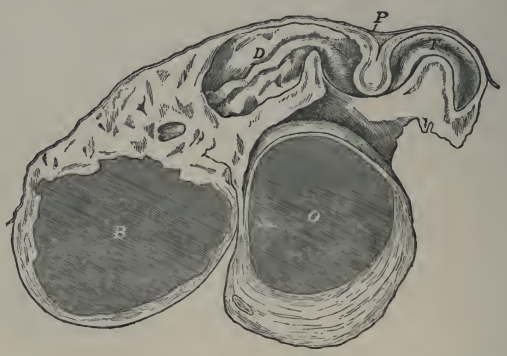

Fig. 4. Marked angulation of tube causing distal dilatation of its lumen (*D*), fimbriated extremity being adherent to (*B*) blood-cyst; (*O*) ovary; (*P*) peritoneum running smoothly over convolution. (From specimen.)

This curling of the tube also accounts for the series of loculi which one frequently finds a dilated tube to be made up of (see specimen, Fig. 5), a most interesting proof of how rigidly a contorted tube main-

[1] *London Obstetrical Society's Transactions*, 1887.

tains its abnormal disposition in spite of the dilating force of the contained fluid, which one would naturally expect to straighten it. The loculated condition of the tube is said by Schroeder, Fritsch, and others to be due to the inability of the tube to expand evenly between the layers of the broad ligament from want of space, a statement which seems quite insufficient when one considers the growth of a simple parovarian cyst in the same situation. This locular condition of the tube is also of clinical importance in showing how fluctuation may be difficult to detect in the diagnosis, and how the thrill may be absent.

As showing how angulation of the tube probably determines the morbid anatomy and course of endosalpingitis, the history of two specimens I here place before you is of much interest.

The one specimen which I show you is, as you see, a well-marked example of interstitial salpingitis, with marked thickening of the calibre of the tube (Fig. 1). The tubes on removal measured 3 inches in length, and were markedly patulous in their entirety, while from them could be squeezed a few drops of pus; they are evidently, then, examples of simple interstitial salpingitis. In the other specimen the tube wall will be seen to be markedly thinned and dilated, and when removed was found to consist of a series of loculi filled with pus. It measured $1\frac{3}{4}$ inches—an example of encysted pyosalpinx (Fig. 5).

Fig. 5.—Transverse section through dilated Fallopian tube; (*T*) Pyosalpinx showing extreme thinning of walls and loculated condition of tube; (*O*) ovary. (From specimen.)

The history of the cases is as follows:—The patient from whom the specimens first described were removed was perfectly healthy till marriage, when she contracted acute gonorrhœa; three months after this time she complained of pain in the side, which continued to get worse till she was operated on after nine months' suffering. She never had any children.

In the second case, the patient had a child about sixteen months old, ever since which time she had been troubled with considerable pain in the sides, but which had become much aggravated within the last month. For the last four months she had a copious yellow discharge, and much scalding on micturition. On examination she was found to be suffering from acute gonorrhœa, while on each side of the uterus were distinctly felt cystic masses, the dilated tubes.

The two cases, then, are examples of tubal complications the direct result of acute gonorrhœa; in the first case the tubes were probably normal, healthy, and patent before infection, and through this means there was ready escape for the purulent secretion from the tube, whose walls eventually became thickened from the spread of the inflammatory process to the deeper structures. In the second case, however, the tubes were probably contorted before

infection, and the secretion from the endosalpingitis was prevented from escaping, a dilatation and thinning of the tube being the natural sequence.

To prevent confusion in the description of like conditions, I would call examples of the first case by the name of pyosalpinx, while examples of the second might appropriately be differentiated by the title of *encysted* pyosalpinx.

To summarize before closing, the points I have endeavoured to bring before you are—

1*st*, That simple contortion of the tube is an extremely common condition.

2*nd*, That it manifests itself as a spiral angular bending.

3*rd*, That it may occur independently of any inflammatory or other apparent morbid change.

4*th*, That when associated with surrounding inflammation, it is more probably the cause than the result of that process.

5*th*, That it is either congenital or acquired, the former being a maintenance of the normal fœtal condition, while the latter is frequently the result of sub-involution after pregnancy.

6*th*, When associated with a secondary endosalpingitis, it disposes towards encysted pyo- or hydro-salpinx from retention of the secretion, and thus gives rise to the loculated condition of many of these tumours.

Lastly, in itself it is sufficient to give rise to those stereotyped signs and symptoms of disease of the appendages, viz., sterility and premenstrual dysmenorrhœa.

Dr Underhill thanked Dr Haultain for his valuable and instructive paper. It was a subject which was not very familiar to most of the Fellows, and which had hitherto been treated in rather a fragmentary and spasmodic fashion. Dr Haultain's observations of the curling and angulation of the tubes as a primary condition on which many of the pathological results with which we are familiar depend, was of great interest and value as bringing the subject into a more homogeneous and satisfactory whole. His theory of the curling being dependent mainly on a subinvolution of the uterus, was well supported by the fact that so many of the diseases of the female pelvic organs were found to follow a first pregnancy, whether that pregnancy came to a natural end, or was broken by miscarriage at an earlier period. The dependence of other cases of tubular disease upon gonorrhœa was another point of interest which accorded with the views of other authors.

Professor Simpson wished also to express his high appreciation of the value of Dr Haultain's communication. It presented in a very clear and convincing form a series of observations in regard to tubal disease that were of extreme importance. As Dr Haultain had said, tubal pathology was a subject of very recent development, and it was by such investigations as he had carried out that true

advances were to be made. Some of the cases he had adduced went to confirm the interesting observations of Professor Freund, who had pointed out the influence of the sinuosities remaining from fœtal development on the production of tubal disease. With regard to the angulation taking place entirely within the peritoneal investment, it would be necessary to make quite sure that at some of these angles inflammatory adhesions of the opposed serous surfaces had not taken place, and an adhesive band come to assume the appearance of the original perisalpynx. The concise clinical history of several of the cases added greatly to the value of this interesting paper.

Dr Ballantyne had listened with great interest to Dr Haultain's original contribution to the subject of the pathology of the tubes, and in most of the points noted his own observations confirmed those of Dr Haultain. He did not, however, think that it had been proved that the sinuosities of the adult tubes were due to a persistence of the tortuosities of the fœtal, for the latter were strikingly uniform in form and size, whilst the former were irregular, both in shape and size.

Dr Armour asked Dr Haultain whether, in any of the cases in which he had found a condition which he considered one of subinvolution of the tubes, he had also found a condition of subinvolution of the uterus?

Dr Haig Ferguson thought that as development proceeded, the convolutions of the fœtal tubes underwent a process of gradual and somewhat irregular unfolding. This in certain pathological conditions took place *very* irregularly, and would thus account for the extremely unequal sinuosities so constantly observed in congenitally diseased tubes.

Dr Berry Hart considered Dr Haultain's paper interesting, but thought he attached too much importance to the angulation of the tube.

Dr Haultain thanked the Society for the manner in which they had received his paper. As to the remark of Professor Simpson concerning the dipping of the peritoneum into the angles formed by the sinuosities of the tubes, he had studied that question particularly, and maintained that it did not do so. He had come to this conclusion, firstly, from the fact that microscopic examination showed no peritoneum immediately surrounding the tube; and, secondly, that in cases of slight twisting, the peritoneum could distinctly be seen to run smoothly over the tube, and not to dip into the angles; while, lastly, it did not obtain in the fœtal condition. He agreed with Dr Ferguson that the fœtal tubes became gradually irregularly straightened, and this accounted for the irregularity of the contortions in the congenital cases. Those cases he had examined which occurred after labour were generally, but not always, associated with subinvolution of the uterus. Dr Hart, he thought, must have misunderstood what he said about thickening

of the tube. Tubes which were contorted and angulated were seldom thickened, they were as a rule, as far as could be made out, normal in structure. The tubes which became thickened were generally patent, and therefore not angulated, and, doubtless, in these cases micro-organisms might participate in the thickening process. When an angulated tube became involved in secondary inflammation it tended to become dilated from retention of secretion, and therefore its walls were much attenuated instead of thickened.

VI. *Dr Ballantyne* read the following letter from Dr E. G. Pilgrim, containing an ACCOUNT OF A CASE OF DECAPITATION BY CORD FOR IMPACTED TRANSVERSE PRESENTATION:—

Dear Sir,—At the suggestion of Prof. A. R. Simpson, I am happy to send you a few notes of a somewhat remarkable case conducted successfully by my fellow-graduate Dr E. W. R. Branch, Govt. Med. Officer of the Island of Tortola. He writes that he was knocked up one night at 3 A.M. by a midwife from the neighbouring Danish island of St John's, imploring him to come over and help a woman who had been in labour nearly two days, the child's hand having been seen at the vulva since 6 A.M. the previous morning. Suspecting a neglected transverse presentation, he gathered up such few drugs and instruments as he had with him and prepared to go. To give his own words, he started with her at once in a miserable leaky little rowboat, 10 ft. long, with three men besides himself and midwife. He arrived after three and a half hours' pull in the darkness. Then had to ride 4½ miles over broken tracks.

The woman was lying on the floor howling. He hoisted her on to a bed. "Right arm of child was sticking out past elbow, and had been so twenty-four hours—a perfect jam; neglected transverse, left dorso-anterior. No fœtal heart heard. Mother had felt no movement for hours. Uterus moulded over child; near bursting, I think. Anterior vaginal wall all prolapsed; everything prolapsed except child. Cord partially prolapsed. It was her twelfth labour.

"I promptly gave her a *deep* dose of chloroform, and, more as a matter of form than anything else, tried internal version, but immediately abandoned the attempt. The jam was absolute, the very rectum seemed choked, and I had grim visions of Bandl and the 'lower uterine segment.' 'Divide et impera,' thought I; but, alas! wherewithal to divide? I had a vague recollection of having heard somewhere that thick twine would do. Happy thought! They are jolly fisherfolk these people, and I shouted, 'Get me a fathom of stout tow-line.' It was produced with military alacrity. I then groped for and found the child's neck; and tying one end of the cord loosely around the third finger of my left hand, I pushed it up with the cord trailing along my palm, until I got the finger well around the neck. I then gradually slipped the end of the cord

off my finger, and worked it round the neck until I could seize and pull it down, enclosing the neck in a loop, both ends of the cord being out at the vagina. I then breathed, and thought to myself that something was going to happen—either the cord or the child's cervical vertebra would be the stronger. I then put in a Sim's speculum to save the vagina, and, seizing one end of the cord in either hand, I sawed away. Presently the loop of the cord came out with somewhat of a jerk. It had not burst. I knew I had divided that child. Once more I breathed, then seizing the child's arm I gently delivered the body. It slid out like an eddoe, with the head taken off as smoothly and as beautifully as the daintiest executioner could have desired. I do not think I shall ever use anything else but fishing-line in such a case; it answers splendidly, and with very little manipulation I think you could always get it round the neck. The speculum in the vagina is necessary, however, or it would get cut by the cord.

"After that I left things alone, and the head was expelled about ten minutes later; then the placenta and membranes followed entire, and when I left the woman, she was quite easy (bar good pains), and uterus as firm and hard as her husband's skull. There was hardly any bleeding. I told the nurse to look out for fever and to use carbolic injections. The prolapse was very troublesome, as with every after-pain it came down again. However, we fixed it up in a fashion. Got home 4.30 next day, and had breakfast and dinner all in one. I hope I have not wearied you with all this, but it really was not a bad case for my first."

I think, Mr Secretary, you will admit that Dr Branch's humour is as remarkable as his ingenuity. I think, too, that you will admire, from many points of view, the singular discretion with which he left the birth of the head to Nature, and, indeed, throughout exercised the very smallest manual interference consistent with the purpose he had in view.

I have gathered from the general tone of his letter that this method of division of a fœtus has many advantages. First, he assures us that its adjustment is by no means difficult. Second, that it performs the work with amazing swiftness,—more swiftly, indeed, than ordinary chain-saws would perform it. The cord (which, I may remark, might be made of antiseptically purifiable silk) is, in truth, a *saw*. The fine serrations and spirals of its strands, presenting, as they do, an irregular continuity, act like so many excessively fine and numerous teeth in their frictional slide over the tissues. Furthermore, the perfect flexibility of the cord insures such perfect adaptation of its grip, that every point of it acts upon every point of tissue with maximum frictional efficiency. Third, its safety to the mother is remarkable. The protection of the vagina by the speculum is a valuable hint in this connexion. But most important of all is the harmless smoothness of the divided surfaces; no jagged edges, no spicula of bone are here possible.

The surfaces are, as it were, planed and polished with sandpaper. No unyielding, hard-pointed instruments are introduced, nothing but the finger tips and the cord. And when one considers the probable condition of the lower uterine segment in such a case, —the possibility, indeed, that that segment is little more than a peritoneal envelope, that partial ruptures may have already begun, that the parts are devitalized and exhausted, and sepsis on their very threshold, in fact, that the life of the mother may, for all that we can know, depend, perchance, on the unbroken continuity of a mere peritoneal endothelium,—one can easily realize how paramount it is that the methods of interference be those of the very gentlest solicitation, and how extremely dangerous might be the opposites hereof. In this connexion, too, you will admire the *deep* anæsthesia which, in true loyalty to Edinburgh and Sir James, Dr Branch was wise enough to insure.

Trusting, Sir, that this case, although in no sense miraculous or amazing, may yet possess some slight interest for you, and feeling, at least, that the members of your learned and honourable Society, many of whom are gratefully admired old teachers of Dr Branch (yourself included), may view with some little Edinburgh pleasure and pride the successes of so recent an alumnus, I am, dear Sir, yours respectfully, EUSTACE GRAHAM PILGRIM, M.B."

Dr Underhill welcomed Dr Pilgrim's paper as a pleasant change. He had never listened to a paper where the humorous played so large a part, while at the same time there was good practical common sense behind it. He had seen it stated that cases of impacted shoulder presentation might be relieved by placing the patient in the genu-pectoral position, which carried the shoulder out of the pelvis into the abdominal cavity and relieved the impaction. It would be worth trying in such a case as Dr Branch had related.

Professor Simpson thought it was doubtful whether placing the patient in the genu-pectoral position would have been helpful in such a case as that of Dr Branch, where the waters had long escaped, and the uterus was collapsed closely round the outline of the child. The idea which Dr Branch had so happily applied in practice had, doubtless, been suggested to him by what he had heard of Pajot's decapitator. As most of the Fellows knew, this consisted of a long rod, curved near the end and hollowed to carry a cord attached to a bullet. The bullet was pushed round the neck of the infant till it could be laid hold of by the operator's finger, and as the hook was withdrawn, the decapitating cord was left encircling the neck. Fortunately for Dr Branch, in his case the neck was so far driven down that without any special instrument he had succeeded in cleverly carrying the line round the neck; and though the history had been given in the familiar form of a letter to a friend, he (Professor Simpson) thought it well worthy of a place in the Society's Transactions.

VII. NOTE ON THE TERM "POSITION."

By D. Berry Hart, M.D., F.R.C.P.E., F.R.S.E., President Edinburgh Obstetrical Society; Physician, Royal Maternity and Simpson Memorial Hospital.

The very unsatisfactory nature of the terminology of the mechanism of labour is well known. It does not follow from this that we should construct new terms, as these would ultimately lead to the same confusion among our successors. All that, in my opinion, we should attempt in most cases is a careful and logical definition of terms, based on our present knowledge. To-night I wish to speak briefly on the definition of the term "position," as it is not only defined in our text-books in the most contradictory and imperfect manner, but even our best definition is contradictory when applied. Position is usually defined as "how the back points," a definition that fails when we speak of face cases, as the left mento-anterior position is here evidently how the front of the body points. The definition I would suggest for position is as follows:—"*Position is the relation to the upper strait of the pelvis of that part of the fœtus which should first rotate to the front in the movement of internal rotation.*" This involves almost no alteration in the nomenclature of the positions in head and transverse presentations, but clashes with our present nomenclature in breech presentations. We speak of these usually as sacro-anterior or sacro-posterior, as the case may be. Now this is not consistent either with the old terminology, or the change I propose. The sacrum is not the functional equivalent of the occiput, chin, or shoulder. It makes the naming of breech positions easy, but it sacrifices accuracy for that purpose. Breech presentations should be named from the hip, as follows,—Left coxa-cotyloid, right coxa-cotyloid, with the addition of sacro-anterior or sacro-posterior as required. The whole nomenclature of positions would thus be as follows:—

Head Presentation.—L.O.A., R.O.A., R.O.P., and L.O.P. (= left occipito-anterior position, etc.)

Face Presentation.—L.M.A., R.M.A., R.M.P., L.M.P. (= left mento-anterior position, etc.)

Breech Presentation.—Left coxa-pectineal or cotyloid (sacro-anterior, sacro-posterior); right coxa-pectineal or cotyloid (sacro-anterior, sacro-posterior).

Transverse Presentation.—Left acromio-pectineal or cotyloid (dorso-anterior, dorso-posterior); right acromio-pectineal or cotyloid (dorso-anterior, dorso-posterior).

In regard to breech and transverse positions we should note that the terms left and right are in relation to the mother, and that we take no cognizance of whether it is the right or left hip of the fœtus. The same holds good for the shoulder.

The advantages of this simple change are that we get position

defined in terms of an important function, so far as its fœtal element is concerned, and that we make its whole nomenclature consistent, and escape the contradictions involved by the usual anatomical definitions.

I have to add one word on the term "presentation." It should be made to equal "*and the long axis of fœtus and uterus correspond* or *cut*." Presentation cannot convey the idea of a complete definition except in transverse presentations, but requires the words head and breech added. Head presentation = head in lower pole of uterus and the long axis of fœtus and uterus correspond; breech presentation = breech in lower pole of uterus and the long axis of fœtus and uterus correspond; transverse presentation = the long axis of uterus and fœtus cut one another.

SPIEGELBERG'S *Text-book* (Hurry's translation).
SIMPSON, A. R.—*British Medical Journal*, 5th November 1887, p. 977.

Dr Milne Murray was scarcely prepared to admit that the new nomenclature suggested by the President in his paper was necessary, nor that it simplifies matters for the student in any great measure. He thought it was not necessary nor was it advisable to define "position" in terms of the mechanism of labour. Position was a matter of diagnosis, and from it we could form in some measure a prognosis, but it ought to be determined in relation to the pelvis, and not to the process of labour. Further, he thought that there was often in text-books and lectures an attempt to define the relation of the head and pelvis with too great accuracy, as if there was an invariable relation between a given point of the head and a given point of the pelvis. He had been accustomed, in defining position to students, to divide the pelvic brim into four quadrants, marked off by the intersection of the conjugate and transverse diameters. Thus two of the quadrants were anterior, two posterior, two were right, and two were left. Position was accordingly determined by the relation of the denominator of the presentation to one or other of these quadrants. Thus, if the occiput lay anywhere in the left anterior quadrant, we had an L.O.A.; if the sacrum lay in the right posterior quadrant, we had an R.S.P., and so on. He had never found that the student had any difficulty in grasping these relationships, and it enabled us to employ a common system to all the presentations. It further avoided the error of implying that position was a matter of fixed relationship between two points—one of the head, and one of the pelvis.

Professor Simpson had heard Dr Hart's suggestions to-night for the first time. He was no way indisposed to the adoption of any new definitions that would help to clearer understanding of the process of parturition. He doubted, however, whether much would

be gained by accepting Dr Hart's nomenclature. The chief objection the President had adduced to our present method was the seeming contradiction of terms in speaking of the relative frequency of the face positions. But it was quite easy to make students apprehend that in the most frequent of the face positions the direction of the child's back was precisely the same as in the most frequent of the vertex positions, though in regard to the mechanism the movements were precisely the reverse—extension in face cases taking the place of the flexion of vertex cases as the first movement; the back of the child turning backwards instead of forwards in the rotation movement; and so on. As the chin had to come under the arch of the pubes in normal face cases, it was best to retain it as the denominator. Dr Milne Murray's suggestion as to the quadrants of the pelvic brim was ingenious, but might be misleading if the student got the idea that the extremities of the occipito-frontal diameter of the head might be found anywhere in their respective quadrants; for he might then imagine that the head lay occasionally nearly in an antero-posterior direction—a position which was so rare as to be quite abnormal. He (Professor Simpson) was in the habit of using a shaded diagram to show that the long diameter of the fœtal head need not lie exactly in the line of the oblique diameter of the pelvis, but that its extremities might have a range of something like an octant of the circle. He would take the President's proposals to avizandum.

Dr Berry Hart did not consider Dr Milne Murray's definition of position any improvement, as it merely gave an artificial division to the pelvic brim, and did not define the fœtal element of position, which was the real difficulty. He (Dr Hart) did not consider any accurate anatomical definition possible, and the functional one he had given was not only legitimate, but solved the difficulty.

VIII. THE HEAD OF THE INFANT AT BIRTH.

By J. W. Ballantyne, M.D., F.R.C.P.E., Buchanan Scholar, 1883; Gunning-Simpson Prizeman, 1889; Lecturer on Midwifery and Diseases of Women, Medical College for Women, Edinburgh; and Lecturer on Diseases of Infancy and Childhood, Minto House, Edinburgh.

Part II.

In a former communication to this Society upon the subject of the Head of the Infant at Birth, in February of this year, the size and shape of the cranium and the characters of the osseous framework of the head were described, and special attention was paid to the results which were obtained from the frozen sectional method of investigation. In the present paper it is my wish to complete the consideration of this subject by the study, by the same method, of the soft parts of the head of the new-born child. The material from which the following conclusions were drawn consisted of five

full-time infants, one eight months' and one seven months' fœtus, and the frozen sectional method of research, which is now too well known to require description, was that employed. The brain and its membranes, the ear, the orbits and their contents, the nasal cavities, and the buccal cavity and sucking pads may now, without further preface, be described.

The Membranes of the Brain and the Cranial Sinuses.—In the infant at birth the arrangement and relations of the membranes of the brain do not differ in any marked way from those found in the adult; but there is a peculiarity as regards the relation of the cranial sinuses to the cranial vault which it is of importance to consider. The superior longitudinal venous sinus lies immediately beneath, and is in relation to the frontal suture, the anterior fontanelle, and the sagittal suture; and, as there is during parturition a varying amount of displacement of the borders of the parietal bones which form the boundaries of the sagittal suture, it follows that a considerable strain is put upon this venous sinus, with the result that occasionally rupture of the walls of the bloodvessel occurs, followed by extravasation of blood into the membranes. In two of the still-born full-time infants extravasations of blood, in one case into the falx cerebri, in the other into both the falx cerebri and tentorium cerebelli, were found; and I believe that this form of intra-cranial cephalhæmatoma is not nearly so rare as an examination of the literature of the subject would lead us to believe. M'Kee, in a paper on "Intra-cranial Cephalhæmatomata" (*Medical Record*, 26th September 1885), lays special stress upon the great rarity of this variety as compared with the extra-cranial; but it is probable that the rarity is more apparent than real, for whilst all cases of the external blood extravasations are easy to diagnose during life, the intra-cranial effusions give rise to symptoms which may be, and no doubt often are, ascribed to other conditions; and, further, post-mortem examinations of the brain of infants are neither easily obtained nor often carried out. Charpentier also (*Traité des Accouchements*, vol. i. p. 294) comments on the rarity of these cases, and points out their frequent association with placental disease, especially hæmorrhagic, and with the coiling of the umbilical cord round the child. In both the cases in which I found intra-cranial meningeal hæmorrhage in the new-born there was placental disease; and in one case, at any rate, the head was subjected to great and continued pressure, for the position was a persistent right occipito-posterior, and forceps were ultimately used to deliver the child. There was also coiling of the cord round the neck of the infant. In both cases the hæmorrhage was meningeal, and could be traced from the tentorium cerebelli to the falx cerebri, and from the falx to the superior longitudinal sinus. In one of the cases there was also a large extra-cranial cephalhæmatoma of the sub-aponeurotic variety; but in the other case there was no blood extravasation outside the cranium, although

there was an unusually large caput succedaneum. All authorities are agreed that the cerebral form of hæmorrhage is extremely rare in the new-born, and I have seen no example of it. In early life the meningeal form of hæmorrhage is more common than the cerebral, whilst in old age the cerebral variety is much more often met with than the meningeal, and this difference is due to the absence of disease of the arteries in early life and the comparative frequency of atheromatous changes in the senile vascular system. It is very probable that many cases of meningeal hæmorrhage in the new-born, beyond causing some difficulty in the resuscitation of the infants affected, and some transient paralytic or convulsive symptoms which are often unobserved, result in complete recovery.

The Brain.—In the new-born infant the brain, on account of its fluid condition, is a difficult organ to study topographically, yet a great deal has been accomplished in late years to clear up the relations of the cerebral fissures and convolutions to the cranial sutures and fontanelles. Various methods of research have been employed in the study of cerebral topography, but none of them have been found quite satisfactory. In the infants examined by the frozen sectional method I endeavoured, before the sections were quite thawed, to trace the relation of the fissures to the cranial sutures, with the following results :—

The Sylvian fissure, which, according to most authorities, is in the adult on a level with the spheno-parietal and squamous sutures anteriorly, is in the infant at a higher level *quâ* the cranium. In a child of one year and ten months, Symington found that the Sylvian fissure lay under cover of the parietal bone about half an inch above the level of the squamous suture, and my sections of the infant at birth fully bear out this observation. Thus in one case the fissure lay 1·5 ctms. above the suture, and in another case 1·7 ctms. above the level of the squamous suture. It is believed that the change in the relative position of the fissure and the suture to be found in the adult is due both to the ascent of the squamous suture and to the descent of the Sylvian fissure from widening of the base of the brain. It was also noted—and the fact may be of some value in the cranial surgery of the infant—that the fissure lay at a level about 2 ctms. above the helix of the ear. The *great transverse* fissure of the cerebrum, which passes into the descending horn of the lateral ventricles, was seen to be as closely as possible on a level with the squamous suture, and a little above the tip of the ear externally. The *great longitudinal fissure* of the cerebrum, which contains the falx cerebri, followed, in the infants examined, the middle line of the head with considerable exactness, and lay immediately beneath the frontal and sagittal sutures and the upper branch of the linea cruciata on the inner surface of the occiput. It lay also under the anterior fontanelle in its antero-posterior diameter. Knott found that in the great majority of cases it had similar relations to the cranial vault in

the adult (" On the Cerebral Sinuses," J. F. Knott, *Journal of Anatomy and Physiology*, vol. xvi. p. 27). The *parieto-occipital fissure* was located in several of my specimens. It marked the division between the parietal and occipital lobes, and corresponded in level with the tip of the occipital bone at the posterior fontanelle, lying rather behind than in front of the lambdoidal suture. According to Broca and Bischoff this is also its position in the adult; but Sir William Turner places it ·7 or ·8 of an inch in front of the lambdoidal suture—a statement with which Professors Ecker and Hare concur. Hamy (*Revue d'Anthropologie*, 1872) agrees with Broca as to its position in the adult, but finds that in the new-born infant it lies a few millimetres in front of the lambdoidal suture. The *fissure of Rolando*, which divides the frontal from the parietal lobe, lies in the adult under cover of the parietal bone and behind the plane of the coronal suture; but in the infant, according to Hamy, the frontal lobes being less developed, it lies relatively further forwards, the upper end of the fissure being behind the coronal suture, whilst the lower end lies under cover of the frontal bone. In one of my cases exact measurements were made which showed that the upper end of the Rolandic fissure lay 4·2 ctms. behind the coronal suture, whilst the lower end reached almost to that suture. In this case also the fissure appeared to be less vertical than in the adult. The *calcarine fissure* seen on the internal surface of the cerebral hemisphere which separates the cuneate lobe from the uncinate convolution, and which, with the parieto-occipital fissure, serves to mark off the cuneate lobe, was traced in two of the infants examined, and was found to lie about 1·5 ctm. below the parieto-occipital suture, and approximately opposite to the occipital protuberance. No special facts of interest with regard to the remaining lobes, convolutions, and fissures of the brain in infants were brought out in these researches, but in connexion with the vexed question of the degree to which the cerebrum overlaps the cerebellum in the new-born infant a word or two may be said. D. J. Cunningham (*Topographical Anatomy of the Chimpanzee, Orang, and Gibbon*, 1886) states that the overlapping is not so great in the infant as in the adult condition, and finds that in the case of mesial sagittal sections the cerebrum overlaps the cerebellum to the extent of 9 mms. in the male infant and 7 mms. in the female infant, whilst in the adult male the overlapping is to the extent of of 25·5 mms., and in the adult female brain to that of 27 mms. Symington, however, found that in two male infants the projection in the middle line was 20 mms. and 19 mms. respectively, a projection relatively greater than that in the adult. In one of my cases the cerebrum measured 11 ctms. in length, and overlapped the cerebellum to the extent of 20 mms. In a second case the cerebrum was 8·5 ctms. in length, and the projection beyond the cerebellum was 15 mms. These measurements, therefore, support Symington in his conclusion that relatively the cerebrum over-

laps the cerebellum as much or more at birth than in adult life; at the same time we must, as this observer points out, remember the fact that in the infant the cerebellum is relatively small.

It will be seen from much that has been said that cerebral topography in the adult, but also more markedly in the infant, is still a very inexact science; but with the discovery of more satisfactory methods of rapidly hardening the brain *in situ*, it is certain that the subject will soon be put on a more exact basis, and that the relation of the cerebrum to the bones of the skull will be as well known as those of the heart and lungs to the thoracic parietes.

The *Pituitary Body or Hypophysis Cerebri* is of great importance, as marking the line of demarcation at the cephalic end of the fœtus between stomodœum and encephalic vesicles and canal of the spinal cord, exactly in the way that the coccygeal body at the caudal extremity of the fœtus marks the spot where the hind-gut and the lower end of the central canal in the spinal cord meet. Bland Sutton suggests what he even terms the somewhat startling conclusion, that the tube which primarily represents the central nervous system in the vertebrate embryo must be regarded as a disused segment of the primitive alimentary canal, connected with the gut anteriorly by the cranio-pharyngeal canal, and posteriorly by the neurenteric canal or passage (post-anal gut). The meeting place of the narrow tubular portion of the anterior primary encephalic vesicle, known as the infundibulum, with the buccal epiblast is marked by the pituitary body. Bland Sutton goes on to state that, even at the mid-period of intra-uterine life, a narrow cavity may be detected passing from the pharynx through the basi-sphenoid so as to come into close relation with the infundibulum. This cavity is afterwards represented by a band of fibrous tissue, which disappears in the macerated sphenoid, leaving what is known as the canalis cranio-pharyngeus of Landzert. In one of my cases, a dropsical infant, in the mesial section of the head the pituitary body was seen resting on the sella turcica of the sphenoid, and in the cartilage joining the basi-occiput and basi-sphenoid was seen a narrow cavity closed both at its pharyngeal and cranial end. This cavity, I have no doubt, represented the canalis cranio-pharyngeus, and its presence in this infant supports Bland Sutton's statement that the alimentary and central spinal canals are continuous in the vertebrate embryo. Another piece of evidence in support of this view is to be derived from the well-known fact that in monsters with a deformed nervous system (as the anencephalic fœtus) there is frequently also deformity of the alimentary canal, *e.g.*, constriction of the stomach or intestine, an example of which I found recently in the dissection of a monster of this variety.

In a coronal section of the head in one of the infants examined the *vidian canal and nerve* were well shown. The vidian nerve, which passes from the spheno-palatine ganglion backwards through

the vidian or pterygoid canal at the base of the pterygoid process of the sphenoid, is relatively large in the infant at birth. The vidian canal also is large at birth, so large that it was only on subsequent dissection that I was led to a correct conclusion with regard to its character.

The Ear.—The ear of the infant at birth presents two peculiarities,—one is the very complete development of the internal ear, the tympanic cavity and ossicles, and the mastoid antrum; the other is the rudimentary state of the external auditory meatus, the mastoid portion of the temporal, and the Eustachian tube. The most important characters which distinguish the infantile from the adult ear are, therefore, to be found in connexion with the last-named parts. The imperfect ossification of the temporal bone, and more especially of its tympanic ring at the time of birth, explains the condition of the external auditory meatus. In the infant also the skull in the region of the ear is in a transition stage: there is anteriorly the antero-lateral fontanelle, which becomes the region *pterion;* whilst behind the ear is the postero-lateral fontanelle, the future region *asterion.* At and between these two fontanelles is found a medley of small bones and cartilage islands, which have no small importance from the point of view of the pathologist. It is not, however, within the scope of this paper to consider the development of the temporal bone, a subject upon which there is as yet no general agreement among embryologists. Suffice it to state, that it is chiefly through the imperfectly developed condition of the tympanic and squamoso-zygomatic portions of the temporal bone at the time of birth that the outstanding characteristics of the infant's ear are produced.

The External Auditory Meatus.—In several of the coronal sections of the heads that were made I was fortunate enough to open into the meatus in the greater part of its extent (Fig. 2). The osseous part of the meatus is insignificant in the infant, being represented by the annulus tympanicus. This ring of bone afterwards grows out to form the floor and the anterior and part of the posterior wall of the adult meatus. The roof of the osseous meatus is formed by the squamosal element of the temporal bone, which in the infant slopes gradually inwards towards the membrana tympani. In the adult the squamous part of the temporal forms at this point a much sharper angle than it does in the infant. From the annulus tympanicus a fibrous membrane is seen passing outwards to two or three pieces of cartilage, and the membrane and the cartilages together form the floor of that part of the meatus which is not ossified. It is in this membrane that ossification occurs, leading to the formation of the tympanic plate; and Symington therefore suggests for this membrane the name "membranous or fibrous tympanic plate." The spaces between the cartilages at the outer end of the external auditory meatus are known as the fissures of Santorini. Whilst the floor of the meatus is thus membranous at

birth, the roof is osseous, for the pars squamosa turns inwards, as already described, to constitute this part of the canal. It is correct, then, in the infant, as in the adult, to speak of an inner osseous part of the meatus and an outer cartilaginous portion; but in doing so it must be remembered that in the infant the inner part is osseous only in the roof, the floor being entirely membranous, or nearly so, for the tympanic ring forms only a slight projection. It is wrong to state that the external auditory meatus is entirely cartilaginous in the new-born; it is partly osseous, partly membranous, and only to a very small extent cartilaginous. In the adult it is customary to look upon the osseous part of the canal as constituting two-thirds, and the cartilaginous part one-third of the total length of the meatus; but in the child at birth a very different proportion exists, for then the inner third alone is osseous, and that only in the roof, the floor being made up of the fibrous tympanic plate.

Varying statements have been made with regard to the length of the external auditory meatus in the infant. It has been stated to be short and rudimentary, and so it does appear if the skull only be considered, but if the soft parts are in position the canal is seen to be of considerable length. In two cases (one an infant at birth, the other an infant that died on the sixth day of life) I found that the upper wall of the meatus measured 19 mms. in length, and the floor 21 mms., the difference in the length of roof and floor being due to the oblique position of the membrana tympani. Symington comes to the conclusion, from the study of coronal sections of infants and young children, that the external auditory meatus is relatively as long or longer in the infant and child as in the adult, and the measurements in my cases fully support this statement; in fact, the figures in the two cases above alluded to are even greater than those found by Symington in full-time infants.

In infants the external auditory meatus has a general inclination downwards as it passes in towards the tympanum; but it has, as a rule, no anterior or posterior curve, for coronal sections of the head in this plane usually expose the meatus in its entire extent, although sometimes a small portion of the external ear has to be removed to show the outer end of the meatus. The inner (tympanic) end of the canal is a little larger than the rest of the meatus, and is called the sinus of the meatus; should a foreign body, therefore, get lodged in this part of the meatus, its extraction is a matter of considerable difficulty.

The *membrana tympani* forms the boundary between the tympanic cavity and the external auditory meatus. It is directed obliquely in the infant as it is in the adult, but some authors state that it is much more oblique, nearly horizontal, in fact, in the infant. I have been able to convince myself, from the study of several frozen sections, that the membrane is not horizontal, although the fact that the external auditory meatus has a down-

ward trend gives to the tympanic membrane an appearance as if it lay almost transversely. In one case I found that the membrane formed an angle of 12° with the floor of the meatus and of 33° with the horizon. In the adult it is stated to form an angle of 45° with the floor of the meatus.

The Tympanic Cavity.—One of the coronal sections (Fig. 2) showed very clearly the division of the tympanic cavity into two parts, the narrow *atrium* internal to the membrana tympani, and the broader *attic* above the level of that membrane. The cavity was seen also to have an irregularly triangular shape, the base being formed by the roof of the tympanum, and the apex by the narrow floor immediately internal to the tympanic membrane. The tympanic ossicles, malleus, incus, and stapes, were seen dividing the attic into an inner and an outer compartment, and their relations are the same as in the adult middle ear. In all the above-mentioned characters the tympanic cavity in the infant does not differ from that in the adult, but there is one point of difference of some clinical importance which has yet to be noticed, and that is the presence in the roof of the attic of an unossified suture. The roof of the tympanic cavity is formed by an outgrowth from the pars petrosa, which joins the squamosal part of the temporal bone; and at the point of junction there is, in the new-born infant, a suture, the *petro-squamous*, which, as Symington points out, increases the risk of inflammation in the tympanic cavity spreading to and involving the membranes of the brain. Clinical evidence shows that this complication of ear disease is very common in the infant, and that therefore the prognosis in otitis media occurring in early life is graver, but at the same time it must be remembered that the thinness of the mastoid portion of the bone will render the operation of trephining comparatively easy at this age and at this spot. If pus form here, and if the diagnosis be made with any degree of certainty, trephining the mastoid is indicated.

The Mastoid Antrum.—The mastoid cells are not developed till after puberty; but, as Symington has shown, there exists in that part of the periotic bone which is named the pars mastoidea a large space, the antrum, which communicates with the tympanic cavity. In all the infants that were examined I found this mastoid antrum, and noted that it had, like the tympanic cavity, a very thin roof, which formed the only separation between it and the cerebral membranes. As the infant grows older, the walls, and especially the roof of the antrum, get thicker, and about the time of puberty become hollowed out into air-cells, which communicate with each other and with the cavity of the antrum. No reference is made to the presence of the mastoid antrum in the ear of infants in the ordinary anatomical text-books.

The Eustachian Tube.—The Eustachian tube is short in the infant. In one of my case it measured 18 mms. in length, and Symington in two nine months' fœtuses found that its length was

17 and 18 mms. respectively. In the adult it measures from 35 to 36 mms., or twice its infantile length. Its direction is different in the infant from what it is in adult life, for in the infant it runs almost horizontally. In one case it was traced throughout its whole course, and was found to run backwards with a slight inclination outwards and downwards, forming an angle of about 10° with the horizon. The osseous part of the Eustachian tube can scarcely be said to be present at all in the infant, although in the adult it forms one-third of the tube. The cartilage of the tube is peculiar in form, being deficient inferiorly and externally. The pharyngeal end of the tube is small in infants, and lies in the same plane as the inferior meatus of the nose. Its aperture is peculiar, there being a prominent margin above and internally, which is wanting below and externally; and this peculiarity makes the passage of the Eustachian catheter less difficult than it would otherwise be. At its tympanic end it is difficult to say where tube ends and tympanic cavity begins, for the roof and walls of the tympanic cavity gradually approximate to form the tympanic end of the tube.

The Face.—The relatively small size of the face as compared with the cranium in infants is rendered very evident by frozen sections, especially those in the vertical sagittal or transverse planes. In a sagittal mesial section the greatest vertical diameter of the face is less than 5 ctms., whilst the greatest vertical diameter of the cranium is more than 10 ctms., and the difference is even more striking when antero-posterior measurements of the two regions are compared together. The face of the infant is nevertheless an important part, for physiognomy is a useful guide to the diagnosis of infantile maladies; and, further, the obstetrician requires to be able to recognise this region of the infant's body when it presents, as it occasionally does, at the os uteri. In making the diagnosis of a face presentation, one is usually instructed to feel the mouth, nose, eyes, supra-orbital ridges, malar prominences, and chin; and at first sight the presence of so many important landmarks would lead one to believe that the diagnosis must be an easy one. I have, however, been struck with the frequency with which students of the tutorial midwifery class in our University fail to recognise the face of the infant, or mistake it for some other part of the body, as the breech. The difficulty is, I believe, due to the fact that the child's face differs in several details from that region in the adult; thus the mouth does not contain teeth, and therefore is sometimes mistaken for the anus, a mistake which should not, however, arise, were the gums carefully felt for. The nose also at birth does not form the prominent feature that it does in adult life, and is liable to be mistaken for the tip of the sacrum and coccyx. Another diagnostic landmark is the eye, and some authorities advise that this organ should be felt for in making the per vaginal examination; but I must say that I think the less the

obstetrician palpates the eye the better, for cases are on record where the enthusiastic tyro has done damage to this organ in his efforts to diagnose a face case. The supra-orbital ridges are useful landmarks, and so is the chin; but in the infant the chin is, on account of the rudimentary state of the inferior maxilla, a less prominent feature than in the adult. There need never be much difficulty in the diagnosis of a face case if the mouth and gums be recognised.

The Superior Maxilla.—The relatively small size of the superior maxilla is one cause of the small dimensions of the infant's face. In the child at the time of birth the antrum of Highmore is a small cavity, and therefore the body of the upper jawbone is also small; and further, the alveolar process of the superior maxillæ is also in a rudimentary condition, from the imperfect development of the teeth. From an increase in the size of the antrum of Highmore, from an enlargement of the alveolar processes, and from the development of the teeth, the growth of the superior maxillæ and of the corresponding part of the face is brought about. The inferior maxilla also is small at birth, its symphysis is not fully ossified, and its angle is an obtuse one; but the development of the teeth during childhood brings it to its adult form and size.

The skin of the face is not so loosely attached to the subjacent bones as is that of the scalp, and hence in face presentations a marked caput succedaneum is rarely developed.

The Orbits and their Contents (Fig. 1).—The orbits and eyeballs do not differ in the infant from the same parts in the adult. In several of the frozen sections made the relations of the parts within the orbit were very clearly brought out. The eyeball measures a little more in its antero-posterior diameter in the middle line than in either its vertical or transverse diameters, the measurements being about 1·7 ctm. antero-posteriorly, and 1·5 ctm. vertically and horizontally. In one of my cases the pupillary membrane was still present. In a plane immediately posterior to the eyeball the muscles have the following relations: the levator palpebræ superioris and the superior rectus lie in close apposition to the roof of the orbit, and are related externally to the lachrymal gland; near the inner wall is the internal rectus, and immediately above it is the superior oblique; close to the outer wall is the external rectus, and near to the floor is the inferior rectus, with the inferior oblique lying internal to it. The optic nerve does not lie in the axis of the orbit, but is nearer to its inner than to its outer wall, and its excentric position is more marked as it nears the eyeball; thus in one of my cases it lay 1·1 ctm. from the outer wall and 7 mms. from the inner wall (Fig. 1). As a result of this disposition of the nerve, the external rectus is the muscle which lies furthest from the optic nerve in its course through the orbit. The large amount of fat lying behind the eyeball is well demonstrated in frozen sections of the head.

The Nasal Cavities (Fig. 1).—The nasal cavities in the new-born infant are relatively small, but in childhood they grow quickly as the surrounding bones and air-cells increase in size and the posterior nares broaden out. The superior meatus has an average length of 1·5 ctm., and passes between the superior and inferior turbinated parts of the ethmoid. The middle meatus measures about 1·8 ctm. in antero-posterior extent, and lies between the inferior turbinated part of the ethmoid and the inferior spongy bone. The inferior meatus, which is the longest, measuring about 2 ctms., lies between the inferior spongy bone and the floor of the nasal fossa. In one of the infants examined the fourth meatus of the nose was present. It is called by Meyer the recessus sphenoethmoidalis, and divides the superior turbinated part of the ethmoid into two portions, to the upper of which the name of concha suprema is given. Into the infundibulum the antrum of Highmore opens by a narrow chink. The septal cartilage of the nose showed in the cases examined no sign of any lateral deviation. The mucous membrane lining the nasal cavities is very vascular, and the specimens I have seen lead me to believe that it is more vascular in the new-born infant than in the adult. It may be, therefore, that at birth, when the first inspiration of air into the delicate lungs is taken, a special arrangement is made to warm the air passing in. In two of my cases the soft palate was seen to be tilted up at its posterior end towards the nasal fossæ, a circumstance which may have been due to attempts to expel mucus from the respiratory passages.

The Buccal Cavity.—In all the sections of the heads of infants which I have made, the mouth was seen as a potential cavity, the dorsum linguæ came into contact with the vault of the palate above, and the tongue was in apposition to the inside of the cheeks and gums laterally. In all the specimens, also, the tip of the tongue lay upon the upper surface of the lower gums. It is a fact worthy of note, that even when the mouth is tightly closed the gums do not come into contact. This fact, which is revealed by frozen sections, Symington specially dwells upon as showing that provision exists at birth for a considerable development of the alveolar arches and teeth before the gums of the two jaws can really meet. I have not, however, been able in my cases to show that the distance between the jaws is so great as Symington found it, namely 6 mms., for in the specimens examined it measured from 2 to 4 mms., and in one case the jaws were in contact. Another peculiarity about the buccal cavity in the new-born infant is the fact that the lower jaw lies in a plane posterior to that of the upper jaw. In a sagittal vertical section of the head, the anterior surface of the lower jaw is seen to lie in the same vertical plane as the posterior surface of the upper jaw. As life advances the jaws come into line with each other, and with the development of the teeth the space between the gums disappears.

If the tip of the tongue be raised in the case of the new-born infant, two folds of the mucous membrane are seen, one of which, the larger and outer, has a dentated margin, and is called the plica fimbriata; the other, which is smaller and is situated nearer to the middle line and the frenum, is known as the plica sublingualis. In one of my cases there was found under the tongue on the right side a congenital ranula which contained a small quantity of clear limpid fluid (Fig. 1).

The Sucking Pads (Fig. 1).—H. Ranke has in a recent paper (Ein Saugpolster in der menschlichen Backe, *Virch. Arch.* Bd. xcvii. pp. 527–547) drawn special attention to pads of adipose tissue which exist in the cheeks of new-born infants, and which are, as Symington shows, present also in the child. Ranke was led to the study of these bodies by the fact that in a child one year old, in a state of great emaciation from continued diarrhœa, the cheeks presented a swollen appearance. This swelling he found to be due to the presence of a distinctly encapsulated mass of adipose tissue, the so-called sucking pad (Saugpolster.) He made sections of the face, coronal and horizontal, in the new-born infant, and also dissections from the skin surface inwards, and found that these pads were distinct structures which were not continuous with the subcutaneous adipose tissue. In several of my sections the relations of these pads could be seen, and they were always easily differentiated from the surrounding fat from the fact that on putting the sections into spirit the pads changed their colour slightly, and shrank from the adjacent tissues in one case to the extent of being easily removable. Each pad lies in the neighbourhood of the duct of the parotid gland, upon the buccinator, and partly upon the masseter muscle, and has superficial to it the musculus risorius of Santorini. An offshoot from the pad passes into the sphenopalatine and zygomatic fossæ. Each has a vertical diameter of about 2 ctms., a transverse of about 1·5 ctm., and an anteroposterior of a little over 1 ctm. They are found not only in the infant but also in the child and adult, and are present even when the adipose tissue in other parts of the body is extremely small in amount. They are no doubt connected physiologically with the act of sucking, hence the name of sucking cushion given to them, and probably act by distributing equally the atmospheric pressure, and preventing the drawing inwards of the buccinator muscle between the gums during the efforts of suction when a vacuum is created in the buccal cavity.

Description of Plate.

Fig. 1.—Coronal section of head in plane posterior to the eyeballs (viewed from behind), $\frac{2}{3}$ nat. size. *a*, frontal suture; *b*, longitudinal sinus; *c*, longitudinal fissure with falx cerebri; *d*, beginning of Sylvian fissure; *e*, left optic nerve; *f*, left sucking-pad; *g*, cystic tumour below tongue; *h*, tongue cut transversely; *k*, right nasal fossa, showing superior, middle, and inferior meatuses; *l*, orbital plate of frontal bone; *m*, zygoma near its root; *n*, tooth germ in upper maxilla.

Fig 1

Fig 2

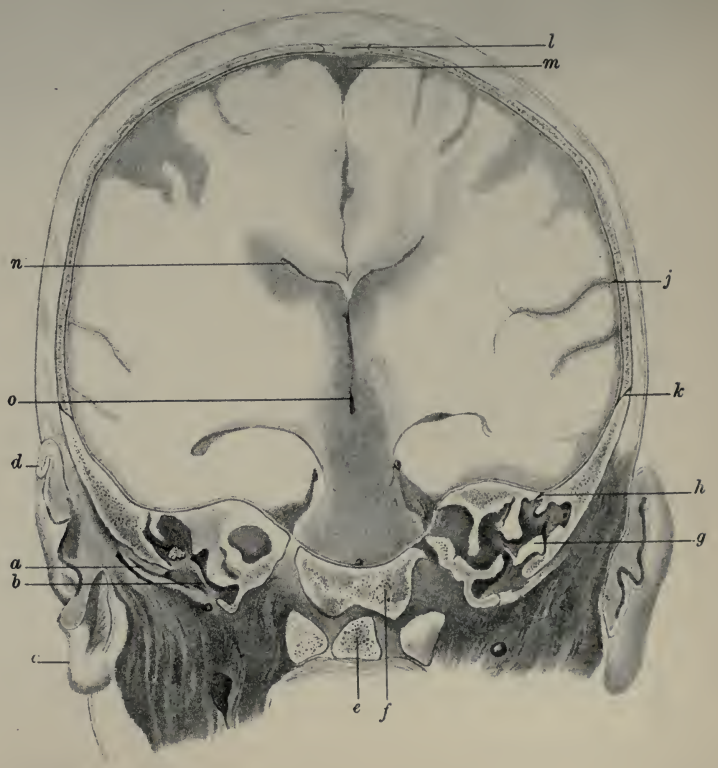

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FIG. 2.—Coronal section of head in plane of the middle ear viewed from behind, right side slightly posterior to left, $\frac{2}{3}$ nat. size. *a*, external auditory meatus (left); *b*, membrana tympani; *c*, lobule of left ear; *d*, helix of ear; *e*, odontoid process of axis vertebra; *f*, basi-sphenoid; *g*, incus, with stapes in fenestra ovalis; *h*, petro-squamous suture in roof of tympanic cavity; *j*, Sylvian fissure; *k*, squamous suture; *l*, sagittal suture; *m*, superior longitudinal sinus; *n*, lateral ventricle; *o*, third cerebral ventricle.

Dr Berry Hart considered the paper a most valuable one, and hoped soon to have an opportunity of studying it in a completed form.

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PRINTED BY OLIVER AND BOYD, EDINBURGH.